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Jorge Marx Gómez
Sulaiman Mouselli *Editors*

Modernizing the Academic Teaching and Research Environment

Methodologies and Cases in Business Research

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Preface

In recent years, the value of publications and research activities have grown significantly, attracting momentous attention from both academics and higher education institutions. Numerous books have been published on research methodologies that range from highly theoretical and conceptual definitions to deep statistical models of the latest research approaches in business. Why, one might ask, should one read—let alone write—another book on the subject?

This book "Research Methodologies" presents the work package WP 6.2. The overall objective of (WP) 6 was the establishment of the center knowledge resources within MATRE (Modernizing Academic Teaching & Research Environment in Business & Economics at Lebanon and Syria) project. This latter is funded by the European Commission under the TEMPUS IV—Sixth call for Proposals; Project Number is: (544001-TEMPUS-1-2013-1-DE-TEMPUS-JPHES). Therefore, the first motivation for this book is derived from MATRE project and shows how academic and collaborative researchers are putting many pieces of research puzzle together to provide an exceptional support tool and an enjoyable piece of reading.

This manuscript provides a rich source of knowledge on research methodologies and explores the experiences of primary teachers and researchers from different countries and disciplines, different backgrounds from different cultures, working in an international environment and collaborating together to develop key ideas and guidelines in the field of academic research. The result of studies of five countries (Spain, Germany, Lithuania, Syria, and Lebanon) participating in the MATRE project has created what makes the book unique in the context of other similar books or all books in the research area.

Thus, the distinguished feature of this book, which the reader will quickly recognize, is the wealth of experience brought by the contributors of different chapters of this book. Moreover, many topics that have been covered are rarely addressed in other books or articles as unique topics. Those features make the book a must-read book and should be recommended for all young business researchers.

This book provides an elementary overview of skills each researcher in the field should acquire to produce sound peace of research. The purpose of this book is not to survey the latest developments in research methods, since it requires updating at rates far exceeding the publication cycles of books. Rather, the aim of this book is to constitute a valuable manual for early researchers who need to grasp the intricacies of research process while avoiding biases and mistakes usually unintentionally make.

Likewise, one of the main objectives of this book is to assist researchers, irrespective of their discipline, in developing the most suitable methodology for their research studies. As the title suggests, this textbook provides cases and examples from Business and Economics research in Lebanon and Syria to support and clarify discussion and arguments.

This book consists of twelve chapters, well organized in a coherent manner. Chapter "Research Methodology: An Introduction" is an introduction to the research methodology. Chapter "Planning the Research" covers key aspects of planning the research. Chapter "Basic Research Methods" presents the basic methods of research. Chapter "Research Topic Identification" highlights the main tasks that the researcher needs to undertake in order to identify the research topic. Different measurement and scaling techniques have been consistently described in Chapter "Measurement and Measurement Scales". Chapter "Common Biases in Business Research" presents the common biases in business research, their consequences, and their proposed treatment methods. Chapter "Research Ethics" deals with the ethics in research. Chapter "Thinking Out of the Box. Non-typical Research Methods in Business" describes some of non-typical research methods in business. Chapter "Research Skills for Business Researchers" introduces the research skills for business researchers. Chapter "Surveys and Questionnaires" examines the survey questionnaire as an instrument of primary data collection in business research. Chapter "Case Study on the Causes of Plagiarism in Some Higher Education Institutions in Syria?" tackles the causes of plagiarisms in some higher education institutions in Syria. In Chapter "The Case of MATRE Questionnaire for Academics: Measurement Scales, Lessons and Questions Reformulation", a case study has been presented to examine the design and application of self-administered questionnaire methodology.

The book has benefited from the active coordination of the University of Oldenburg and the blended cooperation of all MATRE partners and members of the project network who met in Alicante, Oldenburg, Vilnius, and Lebanon over a two-year period.

We would like to gratefully acknowledge the financial support provided by the European Commission, the source of inspiration, who strives toward the modernization of education and research in higher education at Lebanon and Syria.

Especially, we would like to express our gratitude for excellent work done by the project officer Dr.-Ing. Tariq Mahmoud. We are grateful and appreciate all what Tariq have done in order to make this book real.

Also, we would like to thank all the members of the MATRE network who contributed to the first edition of the current book. We would like to thank Viktor Dmitriyev and Christian Osorio from the Carl von Ossietzky University of Oldenburg, as well as Dr. Marie K. Aboujaoude and Khalil Feghali from Lebanese University who helped to compile this book.

It is our hope that this integrated view of research methodologies will inspire our readers and make their research an enjoyable journey. Since research is a continuous learning process, we can confidently say that a revised edition of this book might appear in the future.

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Research Methodology: An Introduction

Vida Davidavičienė

1 The Nature of Research

The challenges of society are difficult to solve, as there are no sources or authorities who can provide us with a solution, especially when changes are so fast. Growing complexity of our civilization means that in the social sciences, at least, new problems develop more rapidly than the old ones already solved. Since a problem is a doubtful case or a difficult question of solution or settlement, it is necessary to understand the relevant facts in order to solve the problem. No reduction in vagueness can be made until the problem has been carefully defined and broken down into specific questions or sub problems. In all aspects of life—social, economic, educational, political, and business—there is increasing emphasis upon research to give for a researcher factual data, which is necessary to solve problems or to understand phenomena.

The term 'research' comes from the French word 'recherché' that means to survey. Research is defined in different sources. Subsequently, some definitions will be presented.

According to Saunders et al. (2012) the research is something that people undertake in order to find out things in a systematic way, thereby increasing their knowledge [1].

Research—studious inquiry or examination; especially: investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws [2].

According to Bryman and Bell (2015) research is a careful inquiry or examination to discover new information or relationships and to expand and to verify existing knowledge [3].

It is the manipulation of things, concepts, or symbols and it has the purpose of generalizing, extending, correcting or verifying knowledge, whether that knowledge aids in the construction of a theory or in the practice of an art. A mechanic or physician

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is a researcher only when he attempts to generalize all about the topic he emphasized in, on one or more characteristics of research that others have minimized, but the general nature of the activity is not in dispute.

Bennett's (1991) definition presented in Veal (2015) defines "research as a systematic, careful inquiry of examination to discover new information or relationships and expend/verify existing knowledge for some specific purpose" [4].

Research discussed in this chapter will be "social science" rather than "natural science" oriented. There are many differences in experimental conditions between these two fields, principally because of the extreme difficulty in running a "control" experiment for purposes of comparison when the research topic is in a social science field.

Progress in research has been accelerated by the discovery and development of methodological procedures making the process more rigorous, discriminating, and dependable. The information and communication technologies (ICT) enable to collect data and detect relationships more rapidly that it is possible to carry on investigations that would have been too costly and too time consuming only a decade ago. Methodological developments have been enhanced by researchers' dedicated belief that unbiased study of all relevant facts is the best way to solve many problems.

It must be admitted that the word "research" is abused in common speech in that it frequently is used to mean "looking up" something in a standard reference book and not the acquisition of new knowledge.

1.1 Scientific Research

Scientific *research* may be defined simply as the systematic and refined use of specialized tools and procedures to obtain a more adequate solution to a problem than would be possible by less discriminating means [5].

"Scientific research is research that conduct with the rules and conventions of science. The means that it is based logic, reason, and the systematic examination of evidence. Ideally, within scientific model it should be possible for research to be replicated by the same or different researchers and for similar conclusions to emerge. Scientific research should also contribute to a cumulative body of knowledge about a field or topic" [4].

Scientific research starts with a problem, collects facts, which are critically analysed, and reaches decisions based on actual evidence. It may well involve tentative hypotheses and, on occasion, experimentation. It evolves from a genuine desire to know rather than from a wish to prove a point of view. As far as possible, it stresses a quantitative approach, seeking to know not only what, but also how much; measurement is therefore an important aspect of scientific research.

Philosophers have frequently discussed the procedures involved in initiating an inquiry. All agree that initially the investigator should clear his mind of traditional viewpoints, but there are numerous differences of opinion as to what the next steps

are. It could be presented six steps of the scientific research which are analogous to the thinking process [1–4, 6–16]:

1. A felt need. This may be considered as the occurrence of some felt difficulty in adaptation of means to a desired end, in identifying the character of an object, or in explaining an unexpected event.
2. The problem. Once one is aware of some questions or problems or difficulties, the next step is to define it in terms of a problem statement.
3. The hypothesis. The third step is stating a possible solution for the problem. The solution may be based upon a hunch, a guess, an inference or a theory.
4. Collection of data as evidence. The fourth step is the collection of data, information, or evidence to bear out the implications of a hypothesis.
5. Concluding belief. On the basis of the evidence the idea is corroborated or rejected and a concluding belief is formulated through the experimental analysis of the hypothesis.
6. General value of the conclusion. After a solution has been found to work, there is a mental "looking forward", the general purpose of which is to appraise this new solution in the light of future needs. This is the answer to the question, "So what?" that is often raised at the end of many research efforts.

The point of view expressed in this text is that good research methodology must reflect good thinking, and that these steps in the thinking process might well serve as procedural guides in the development and execution of research investigations.

Most sources suggest understanding research processes as multi-stage processes, the number of stages varies. One of such presented below.

Steps in General Research Methodology. In other words, (formulation) there are six steps in the development of a research project which have general applicability:

1. Selection of the topic or problem for investigation.
2. Definition and differentiation of specific aspects of the topic.
3. The framing of working hypotheses to facilitate the preparation of a logical study design.
4. Collection of pertinent data.
5. Analysis and interpretation of the data.
6. Written report of the research study.

Another example could be—(1) reviewing literature, (2) designing research methodology, (3) collecting data, (4) analysing research results, and (5) writing report.

Theoretical Framework for Research. Basic to good scientific research is a theory which serves as a point of departure for the successful investigation of a problem. In this respect a theory is a tool of science since it may be used to define the kinds of data to be analysed; it provides a guide to the way in which data are to be systematized, classified, or interrelated; it often points out new facts; and it often identifies areas in which our present knowledge is unsubstantiated or lacking entirely. In its simplest form a theory may be nothing more than a guess, a conjecture, a speculation, or an idea. A more complicated theory may be a summation of facts which have been accumulated in a given subject, an analysis of a set of facts in their ideal relationships

to one another, a set of general or abstract principles, or a more or less plausible general principle offered to explain phenomena.

As more and more facts relevant to a theory are gathered, tentative generalizations can be made from them. These generalizations are usually referred to as a set of postulates. Deducing from a set of postulates one formulates a hypothesis—a statement capable of being tested and thereby verified or rejected.

When researchers seek first to secure their facts and then draw conclusions, they have reached the ***stage of hypothesis and experimentation***, a stage which may lead to a fifth and more precise stage if the information involved is capable of being reduced to quantitative terms. It is a proposition which can be put to a test to determine its validity. It may seem contrary to, or in accord with, common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test. Whatever the outcome, the hypothesis is a question put in such a way that an answer of some kind can be forthcoming. It is an example of the organized scepticism of science, the refusal to accept any statement without empirical verification. Every worthwhile theory, then permits the formulation of additional hypotheses. These, when tested, are either proved or disproved and in turn constitute further tests of the original theory. In either case they may be of use to existing theory and make the formulation of still other hypotheses possible.

The development of quantitative research has been comparatively recent in the social science areas which are of interest to business. Much of the credit is due to census information, which is becoming increasingly detailed and describes many aspects of our economy. Among other sources of quantitative data are the national income accounting system, sales tax returns, employment, and corporation accounting records that are much more complete and reasonably comparable because of the income tax. Most of these data have been collected by government agencies.

These various stages are not clearly separated from each other; it has already been noted that scientific research may be interwoven with speculation and argumentation because the facts that have been ascertained must be interpreted. It is impossible to avoid value judgments in dealing with the interpretation of facts, because facts discovered are of no use unless they are applied to human problems. This necessitates criteria and assumptions, the choice and acceptance of which may bring us to a situation having some similarities to the authority and tradition stage.

It should be noted that many theories are stated vaguely, do not specify the variables and conditions involved, and give inadequate cues as to what is to be measured, they do not form an adequate basis for research. Theories of a complicated and complex nature usually involve variables which we cannot measure or evaluate because instruments adequate for this are lacking at present.

The more productive researches, as carried on by graduate students and reported in theses and dissertations, have referred to somewhat limited phenomena and have been stated in fairly simple terms.

1.2 Business and Management Research

Because of the great strides that are being made in the natural sciences due to research, we are inclined to associate the term research with physics, chemistry, biology, and other laboratory disciplines. However, research (or scientific investigation, as it is frequently called) is of equal importance to the social sciences, the humanities, and applied fields. Our society is so strongly business oriented that virtually every aspect of our environment impinges upon business management; and, therefore, research in all fields is relevant to business administration. Such research might involve the social, political, and economic framework within which business now operates and has operated in the past; incentives and satisfactions that do or do not arise from work—a broad topic that includes labour relations, industrial sociology, and industrial psychology; those aspects of production that have to do with work flow, plant layout, and the host of internal operations necessary to keep the firm operating successfully; and the already well-established fields of market and accounting research.

Business and management research deals with social science, because it usually related to people or groups of people and their behaviour, which is challenging because of changes in environment and hardly predictable fluctuations of research object (people) mood, reactions etc.

Using Saunders et al. (2012) definition, *Business and Management research* can be defined as understanding systematic research to find out things about business and management [1]. Most *business research* is conducted either within a firm by private research organizations and trade associations, or in colleges and universities. Research within a firm may be under the immediate direction of top management, although such research is likely to be sporadic and to deal only with immediate problems. According to Veal (2005) "the primary activity of a manager involves coordinating and facilitating the management of people and resources in an organization" [4]. Anyway, it can be understood in much more complex way. Longer-range studies are often conducted by full-time researchers who submit their reports to the sales manager, or the head of some other functional department. Private research organizations and trade associations frequently have the facilities and personnel to conduct highly specialized studies. Finally, business research conducted in colleges and universities is important: some is conducted independently by the faculty, much is carried on by graduate students writing doctoral dissertations, and some is conducted directly by university bureaus of business and economic research. Here can emphasized knowledge from different disciplines be used in management research in order to gain new insights, which is impossible to identify when doing research in each of them separately [1]. Another aspect which is important—that all ideas usually related to practice, and if speak on scientific research in business and management fields—it should be related to theory and practice.

Managers need to be competent in investigative approaches to decision making and problem-solving. The research process, while being the means of advancing knowledge, also serves as disciplined and systematic procedure of help in solving managerial problems. The research sequence could be compared to the decision-

making part of a broader problem-solving cycle. Many managers are probably involved in research without identifying it as such. The traditional tasks of management are usually defined in terms of planning, coordinating, and controlling and so on. Research is rarely mentioned in the same breath as management unless it is in the context of management education [17].

Business managers increasingly rely upon research, in part, because the newer generation is better trained and more sophisticated in the use of statistics and other research tools. Another result of this training is, that a growing number of business managers watch closely the results of research activities conducted in colleges and universities.

1.2.1 Managers as Action Researchers

Management is often regarded as synonymous with action. Managers spend the majority of their time making or implementing decisions through the use of verbal interventions. It seems particularly relevant, therefore, that managers can be seen as action researchers in their own organizations. Action research is a form of organizational development that involves a process of systematic data collection, reflection and action planning. In essence, action research entails some form of planned intervention in a situation by an organizational agent, for example a manager or an external consultant. The effects of this intervention are subsequently monitored in some way and critically evaluated to see if the chosen course of action has produced the expected outcomes. The difference between action research and just managing is one of awareness and rigorous application of methods. The argument is that managers can make more effective interventions by knowing more about the research options available to them, as well as about the theoretical assumptions on which they are based.

Theory has an important function in this process. It may be useful to differentiate its uses in two ways; in terms of our being theory-dependent and theory-laden. As decision-makers, we are:

- Theory-dependent, because we create, apply and evaluate theories all the time. We act on speculation and explanations of phenomena, often in unconscious ways;
- Theory-laden, because our observations are influenced by our prior theories and values. These values, together with our knowledge of theories, influence what we see and the value we attach to what we see.

1.2.2 Managers as Ethnographers

As well as action researchers, managers may also be regarded as organizational ethnographers. Ethnography is the art and science of describing a group or culture. It could be to compare the task of an ethnographer to that of an investigative reporter who interviews people, records events, and makes some kind of judgement about the

events that have been reported. The difference is that ethnographers concern themselves with routines of everyday life rather than the unusual [17]. Ethnography is in essence anthropology, and involves using techniques such as participant observation in a mainly inductive and naturalistic way. The concepts and practices of ethnography are particularly relevant if we accept the view of managers as a subculture that is a social collectively whose members share a set of implicit and explicit meanings acquired through innumerable communicative exchanges.

Every cultural pattern and every single act of social behaviour involves communication in either an explicit or implicit sense [18]. An ethnographer attempts to explore this implicit sense by examining the use of signs, myth and language, and any possible contradictions between the implicit and explicit messages which are conveyed to organizational members via the "vehicles" of signs, myth and language.

Another aim of the ethnographer may be to explore the ways in which we are controlled or impelled to act as a result of the myths that surround us. You may think of the word "myth" as odd in this context, believing it to be more appropriate to studies of ancient Greece and Rome. Myth is the complex system of images and beliefs which a society constructs in order to sustain and authenticate its sense of its own being: i.e. the very fabric of its system of meaning. In this light it becomes apparent that myths are a common, everyday phenomenon.

We also internalize reality as an objective phenomenon through the medium of language that constitutes the most important content and the most important instrument of socialization. Reality is created through language. Language, whilst often regarded as neutral, can actually be regarded as a potent political device. In this sense, political refers to the degree to which we are influenced, through linguistic expression, to accept particular perspectives on a person, issue or event.

If we have no wider theoretical or experiential reference points by which to analyse everyday situation, then we are more likely to accept them as common sense and beyond question. If, however, we begin to address such concepts as power and symbolism, gender and power relationships, or we have external knowledge from other cultures that offers us other examples of social organization, then we begin to locate our perceptions and experiences in a wider framework. Knowledge offers us the capability to widen our perspectives on life and sometimes we may begin to question what we have previously regarded as normal.

Ethnography emphasizes the idea of the researcher as theory-builder, not just theory-consumer. We are all theory-builders, but theory has come to be defined in such narrow terms that we come to see ourselves as practical people who have little time to theory.

In summary, theory often carries pejorative connotations for many managers. Our actions are theory dependent; we are all theory-builders whether we recognize it or not. And we are all theory-laden; we carry with us a set of assumptions about life, and we make sense of situations in certain ways. Our actions may be determined by theories we may not even realize we hold. We have argued that our way of seeing the world may be determined by our assumptions regarding the nature of reality, knowledge and human nature. All of these can determine our methodology

when making sense of ourselves, our role, and our interactions with others, our organization, and the wider environment.

Research is a fundamentally important, yet understated, element of the management decision-making process. In order to improve decision-making skills, managers cannot afford to regard research as the exclusive domain of students or academics.

1.3 Kinds of Research Investigations

Research study investigations are classified under four general categories, namely: library, life and physical science, social, and technological research.

Library research is a kind of research that is conducted primarily using written materials most commonly located in large libraries, World Wide Web and in virtual scientific databases. It is concerned with the seeking out of significant facts and interpretations from the past and from the extensive data and statistical information about contemporary life that frequently found in government documents, professional journals, and similar sources. Studies concerned with the evolution of theories and research into possible cause and effect relationships are likely to rely heavily on the use of library material. Library research that is worthy of the name necessitates generalizations and conclusions not previously appreciated.

Life and physical science research is, for the most part, empirical. It tends to utilize laboratories more than libraries, and the resulting reports are often shorter than those based on written sources. Although organizations are involved in laboratory research that may affect business operations, their findings do not normally have immediate relevance to management. Therefore, little business research is of this kind.

Social research is defined here to include research in both the social sciences and the humanities. It is devoted to a study of mankind in his social environment and is concerned with improving his understanding of social orders, groups, institutions, and ethics. This definition should be construed broadly enough to include research in such fields as foreign languages, philosophy, religion, etc. Social research is becoming increasingly important in business.

Technological or applied research consists largely of the application of the previously listed kinds of research to the immediate needs of business or industry. Much of the research conducted by business firms—aside from "scientific" research—is technological.

Speaking about Business and management research specifics of discovery or finding out, explanation, evaluation and judging leads to three types of research [4]:

- *Descriptive*—finding out, describing what is (like census of population, and surveys of households expenditure, to monitor social and economic change);
- *Exploratory*—explaining patterns, relationships and trends, to establish causality (using to predict demand, sales, impact, etc.);
- *Evaluative*—evaluation of policies, strategies, programs and practices.

1.4 Stages in the Development of Research

The history of intellectual development has been characterized by forward spurts followed by plateaus of complacency. Throughout history man has evolved various approaches for answering perplexing problems about life. Even as early as Aristotle research findings and empirical knowledge were being used in the physical and biological sciences. Research in the social sciences developed much more slowly, probably because the social sciences deal not only with topics which are less amenable to objective determination, but also because problems in the social sciences often involve strong vested interests that tend to make investigations proceed in an emotional atmosphere. Nevertheless, the research approach to problem solving has, in most disciplines, been preceded by three other approaches: (1) trial and error, (2) authority and tradition, and (3) speculation and argumentation.

Trial and Error. During the infancy of a science, observations are for the most part casual and qualitative—the sun rises, beats down strongly at midday, and sets; the moon grows from a crescent to full and then diminishes. In this first stage, man does not have logical explanations for all of the observed relationships composing a science, and he "muddles" along, trying one thing after another, until he finds an acceptable solution. As the process of sifting out those methods and procedures that do not produce satisfactory results continues, a few principles gradually emerge. Hence, sheer trial and error may be considered the first stage in the development of a science.

Authority and Tradition. In the second stage, "leaders" of the past are quoted. Often they were partly or completely wrong, but their opinions were stated with such assurance and force that they eventually became hallowed as a traditional view. The development of the natural sciences has involved many clashes with tradition: the names of Galileo and Darwin are associated with especially bitter crossing of swords. Many propositions of religion and social action claim support from some sacred text, tradition, or tribunal whose decision on such questions is vested with finality. Political, economic, and educational questions are frequently determined by appeals to such authorities. People may rely on tradition if they lack the time or training to settle particular problems, and in some societies certain traditions and authorities are considered so infallible that external force may be invoked to give sanction to their decisions.

Speculation and Argumentation. In the third stage the authorities are frequently doubted and solutions of fact are sought through debate. This is the stage of philosophizing, or speculation and argumentation. The Wealth of Nations, written by Adam Smith and published in 1776 [19], was the first popular questioning of the mercantilist philosophy which was the traditional approach to international economic relationships (and which is by no means dead in the mid-twentieth century). This book did much to stimulate the speculation in the field of economic policy that has continued to the present time.

As soon as basic data are available in substantial quantity, speculation, instead of being based on a priori reasoning exclusively, becomes modified by empirical

material. The more empirical material there is the closer speculation becomes tied to reality.

Other sources suggest to divide research to pure, applied, and practice types [9].

Pure research. Results are oriented to academic audience, usually disseminated via scientific literature sources such as books, articles, conference papers, etc.

Applied research. Mostly it is application of knowledge for solving particular problems.

Action research. This approach suggested by Rapport in 1970 presented in Easterby-Smith, Thorpe, and Jackson (2012) "Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joining collaboration within a mutually accepted ethical framework" [9].

2 The Meaning of Theory

2.1 Research Methodology

Method can be described as a set of tools and techniques for finding something out, or for reducing levels of uncertainty. According to Saunders (2012) method is the technique and procedures used to obtain and analyse research data, including for example questionnaires, observation, interviews, and statistical and non-statistical techniques [1]. *Methodology* addresses the philosophy of method in addressing such questions as "is this the most appropriate technique?", "how valid are my findings?", "can the findings be extrapolated to other situations?" and so on [17]. According to Saunders (2012) it is theory of how research should be undertaken, including the theoretical and philosophical assumptions upon which research is based and the implications of these for the method or methods adopted [1].

The Scientific method found in the work of Zikmund et al. (2012) is the use of a set of prescribed procedures for establishing and connecting theoretical statements about events and for predicting events yet unknown [16]. There is no consensus concerning exact procedures for the scientific method, but most discussions of the scientific method include references to "empirical testability". Empirical means that something is verifiable by observation, experimentation, or experience. The process of empirical verification cannot be divorced from the process of theory development.

Like all abstractions, the word "theory" has been used in many different ways, in many different contexts, at times so broadly as to include almost all descriptive statements about a class of phenomena, and at other times so narrowly as to exclude everything but a series of terms and their relationships that satisfies certain logical requirements. Theory dividing to everyday theory, academic theory proposed in Easterby-Smith et al. (2012): *everyday theory* reflects to the ideas and assumptions carried out for making sense for everyday observations; *academic theory* tend to present higher level of generalisation [9].

For our purposes, a theory is a coherent set of general propositions, used as principles of explanation of the apparent relationships of certain observed phenomena [16]. A key element in our definition is the term proposition. Before a proposition can be explained, the nature of theoretical concepts must be understood.

Theory development is essentially a process of describing phenomena at increasingly higher levels of abstraction [16]. Things that we observe can be described as ideas or concepts. A concept (or construct) is a generalized idea about a class of objects, attributes, occurrences, or processes that has been given a name. If you, as an organizational theorist, describe phenomena such as supervisory behaviour, you would categorize empirical events or real things into concepts. Concepts are our building blocks and, in organizational theory, "leadership", "productivity" and "morale" concepts. In the theory finance, "gross national product", "asset" and "inflation" are frequently used concepts. Theorists translate their conceptualization of reality into abstract ideas. Thus theory deals with abstraction. Things are not the essence of theory, ideas are. Concepts in isolation are not theories. Only when we explain how concepts relate to other concepts do we begin to construct theories.

Saunders et al. (2012) suggest understanding of theory as formulation regarding the cause and effect relationships between two or more variables, which may or may not have been tested. And such aspect as logical reasoning is emphasized while explaining existing relationships of researched phenomenon [1].

2.2 Universality of Research Methods

Methods of research may be classified from many points of view [1, 4, 9, 10, 14, 16, 20]:

- *the fields to which applied*: education, history, philosophy, psychology, biology, etc.;
- *purpose*: description, prediction, determination of causes, determination of status, etc.;
- *place where it is conducted*: in the field or in the laboratory;
- *application:* pure research or applied research;
- *data-gathering devices employed*: tests, rating scales, questionnaires, etc.;
- *character of the data collected*: objective, subjective, quantitative, qualitative, etc.;
- *symbols employed in recording, describing, or treating results*: mathematical symbols or language symbols;
- *forms of thinking*: deductive, inductive, etc.;
- *control of factors*: controlled and uncontrolled experimentation;
- *methods employed in establishing causal relationship*: agreement, difference, residues, and concomitant variation.

Where there is a shifting of a point of view in a given classification, without warning or explanation, the result almost always is confusing. Still another classification of

research methodology, commonly encountered, is: historical, library, field survey, case study, statistical, genetic, and experimental.

A simple dichotomy used frequently in social science research is that between quantitative and no quantitative (or descriptive and reflective). The increasing emphasis upon quantitative measurement of findings, the development of ICT and software for data-processing, and improvements in statistical methods have resulted increase in quantitative studies in business research.

Good research uses a number of methods. Nearly all research projects require the use of more than one technique or method. Even though the principal portion of the project uses data obtained directly from the field, the initial phase of the report is usually a recapitulation of existing information about the problem and a description of its background. This may involve historical, library, and case study methods. The field work may result in the collection of several hundred questionnaires or interview schedules which are subjected to statistical analysis. A part of the study may lead the researcher to conduct limited experiments to test certain hypotheses on conjectures that he has developed. These tests would be examples of the experimental method.

Since no two research undertakings, nor the researchers who conduct them, are exactly alike, it is impossible to set forth any rigid formulation of method or procedure. There is a wide variation in the conditions and circumstances which determine the objective nature of research projects in different fields. Thus, all methods defy portrayal in terms of formula or standardization. However, it is possible, taking into account the basic considerations and fundamental techniques of research, to outline in general how a research study should be conducted.

2.3 Nature of Propositions

Concepts are the basic units of theory development. However, theories require that the relationship among concepts be understood. Thus once reality is abstracted into concepts, the scientist is interested in the relationship among various concepts. Propositions are statements concerned with the relationships among concepts. A proposition explains the logical linkage among concepts by asserting a universal connection between concepts. A proposition states that every concept about an event or thing either has a certain property or stands in a certain relationship to other concepts about events or things.

As presented by Zikmund et al. (2012) concepts abstract reality, is expressed in words that refer to various events or objects [16]. For example, the concept "asset" is an abstract term that may, in the concrete world of reality, refer to a specific punch press machine. Concepts, however, may vary in degree of abstraction. The abstraction ladder indicates that it is possible to discuss concepts at various levels of abstraction. Moving up the ladder of abstraction, the basic concept becomes more abstract, wider in scope, and less amenable to measurement. The basic or scientific business researcher operates at two levels: the abstract level of concepts (and propositions) and the empirical level of variables (and hypotheses). At the empirical level,

we "experience" reality, that is, we observe or manipulate objects or events. If the organizational researcher says, "Older workers prefer different rewards than younger workers," two concepts—age of worker and reward preference—are the subjects of this abstract statement. If the researcher wishes to test this hypothesis, John, age 19, Chuck, age 45, and Mary, age 62—along with other workers—may be questioned about their preferences for salary, retirement plans, intrinsic job satisfaction, and the like. Recording their ages and observing their stated preferences occur at the empirical level.

Researchers are concerned with the observable world, or what we shall loosely term "reality".

Consider the following behavioural science proposition that permeates many business theories: If reinforcements follow each other at evenly distributed intervals, and everything else is held constant, the resulting habit will increase in strength as a positive growth function of the number of trials. This proposition identifies theoretical relationships between the concepts "reinforcements" and "habit". It identifies the direction and magnitude of these relationships.

We have indicated that a theory is an abstraction from observed reality. Concepts are at one level of abstraction. Investigating propositions requires that we increase our level of abstract thinking. When we think about theories, we are at the highest level of abstraction because we are investigating the relationship between propositions. Theories are networks of propositions.

An Example of a Theory [17]

The theory explain voluntary job turnover, that is, an individual's movement to another organization or movement to another position within the same organization. Two concepts—(1) the perceived desirability of movement to another organization and (2) the perceived ease of movement from the present job—are expected to be the primary determinants of intentions to quit. This is a proposition. Further, the concept intentions to quit is expected to be a necessary condition before the actual voluntary turnover behaviour occurs. This is a second proposition that links concepts together in this theory. In the more elaborate theory, job performance is another concept considered to be the primary determinant influencing both perceived ease of movement and perceived desirability of movement. Moreover, perceived ease of movement is related to other concepts such as labour market conditions, number of organizations visible to the individual and personal characteristics. Perceived desirability of movement is influenced by concepts such as equity of pay, job complexity, and participation in decision making.

A complete explanation of this theory is not possible; however, this example should help the reader understand the terminology used by theory builders.

Verifying Theory [17]

In most scientific situations there are alternative theories to explain certain classes of phenomena. To determine which the better theory is, researchers gather empirical data or observations to verify the theories.

Maslow's hierarchical theory of motivation offers one explanation for behaviour. For example, Maslow theorizes that individuals will attempt to satisfy physiological needs before self-esteem needs. An alternative view of motivation is provided by Freudian (psychoanalytic) theory, which suggests that unconscious, emotional impulses are the basic influences on behaviour. One task of science is to determine if a given theoretical proposition is false or if there are inconsistencies between competing theories. Just as records are made to be broken, theories are made to be tested.

It must be possible to demonstrate that a given proposition or theory is false. This may at first glance appear strange. Why "false" rather than "true"? Technically, there may be other untested theories which could account for the results we obtained in our study of a proposition. At the very least, there may be a competing explanation which could be the "real" explanation for a given set of research findings. Thus, we can never be certain that our proposition or theory is the correct one. The scientist can only say, "I have a theory which I have objectively tested with data and the data are consistent with my theory." If the possibility of proving an idea false or wrong is not inherent in our test of an idea, then we cannot put much faith in the evidence that suggests it to be true. No other evidence was allowed to manifest itself.

Business research gathers facts to verify theories. However, the researcher who wishes to identify inconsistency within a particular theory must understand the difference between facts and theories: facts and theories are different things, not rungs in a hierarchy of increasing certainty. Facts are the world's data. Theories are structures of ideas that explain and interpret facts. Facts do not go away when scientists debate rival theories to explain them. Einstein's theory of gravitation replaced Newton's, but apples did not suspend themselves in mid-air pending the outcome.

2.4 How Are Theories Generated?

Where do theories come from? Although this is not an easy question to answer in a short chapter on theory in research, we shall nevertheless explore this topic briefly.

In this chapter, theory has been explained at the abstract, conceptual level and at the empirical level. Theory generation may occur at either level. At the abstract, conceptual level, theory may be developed with deductive reasoning by going from a general statement to a specific assertion. Deductive reasoning is the logical process of deriving a conclusion from a known premise or something known to be true. For example, we know that all managers are human beings. If we also know that Vardenis

Pavardenis is a manager, then we can deduce that Vardenis Pavardenis is a human being.

At the empirical level, theory may be developed with inductive reasoning. Inductive reasoning is the logical process of establishing a general proposition on the basis of observation of particular facts. All managers that have ever been seen are human beings; therefore all managers are human beings.

Suppose a stockbroker with 15 years' experience trading on the New York Stock Exchange repeatedly notices that the price of gold and the price of gold stocks rise whenever there is a hijacking, terrorist bombing, or military skirmish. In other words, similar patterns occur whenever a certain type of event occurs. The stockbroker may project these empirical observations to a more generalizable situation and conclude that the price of gold is related to political stability. Thus the stockbroker states a proposition based on his or her experience or specific observations.

Over the course of time, theory construction is often the result of a combination of deductive and inductive reasoning. The experience leads to draw conclusions that we then try to empirically verify by using the scientific method.

It is useful to look at the analytic process of scientific theory building as a series of stages. Seven operations may be viewed as the steps involved in the application of the scientific method: Assessment of relevant existing knowledge; Formulation of concepts and propositions; Statement of hypotheses; Design the research to test the hypotheses; Acquisition of meaningful empirical data; Analysis and evaluation of data; Provide explanation and state new problems raised by the research.

3 Research Philosophies and Approaches

Main philosophical positions are important in design of management research because they underline outcomes from research activities, it helps to clarify design of research, and identify limitations in first stages. One of best illustrations for understanding complex or research is "research onion" proposed by Saunders, Lewis and Thornhill (2011) presented in Fig. 1 [1].

Speaking about research methodology, we should speak about philosophies, and it does not mean that one or another is better. It should be taken into account research problem, question and aims which researcher has. Research onion helps to understand systematically the philosophies and approaches, and to give arguments on methodological choices.

3.1 Assumptions About Reality

Assumptions about reality was explained clearly by M. Teale et al. (1999) [17]. Explanation was presented as following. When we use the word "natural" and "normal", we should consider what we really mean in terms of the discussion that follows.

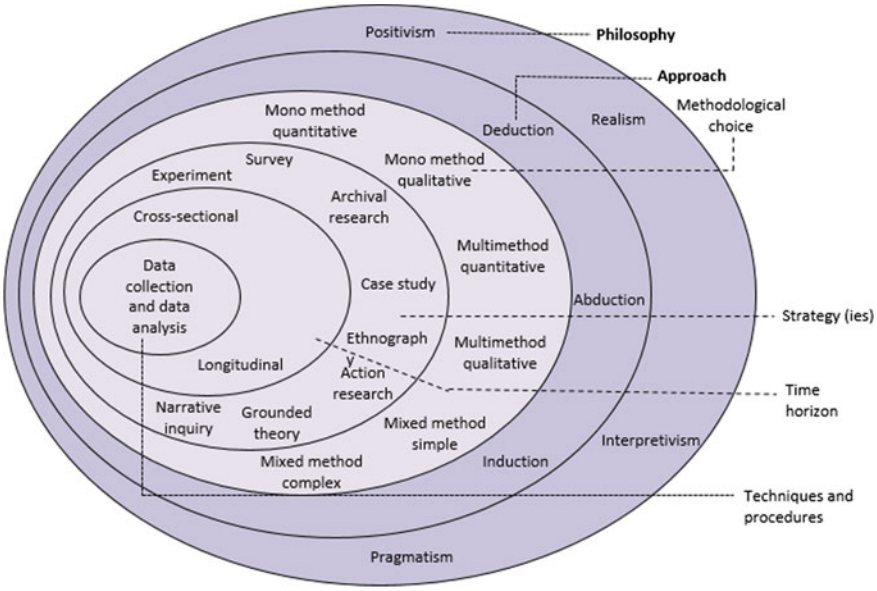

Fig. 1 The research onion [1]

The discussion sets out a broader theoretical context of approaches to the social sciences. The study of reality, sometimes called ontology, deals with issues concerning the nature of reality itself. When we say something is "real", what do we mean? For instance, "this is a real problem". Real according to what criteria? What are the alternatives? What would the problem be if it were not real? Unreal? Imagined? Usually when we talk about "reality" in this way, we are implicitly addressing philosophical question such as, "is reality external to the individual or is it the product of an individual's consciousness?" So, "this is a real problem" may be interpreted as 'the problem is not just in my head'; others obviously think there's a problem too". The difficulty is that the use of the word "real" in the context of everyday speech is not as rigorously delimited as it is within the context we are discussing it now, so the example could be dismissed as a semantic triviality. Nonetheless, that should not stop us from examining underlying reasons why we might behave and act in particular ways; after all, those ways might not always be appropriate and we might wish to change them.

Ontology—is an understanding nature of reality. We should remember that these are theoretical positions, and it is likely that most people would believe that the answer to the question "is reality a product of our mind or of the world outside it?" lies somewhere in the middle, that reality is the product both of our own consciousness and of our interaction with the external world. In social sciences, two aspects should be emphasized *objectivism* (e.g. Social entities exist independent from social actors: management itself, like organization structure and management stay even if

employee's changes) *and subjectivism* (e.g. social phenomena rise from the understanding and changing actions of social actors).

It is fair to say that in western culture the natural science are often advocated as the most valid way of researching social phenomena. This has tended to deflect attention from the idea of human agency. As humans we are capable of producing a word that we then experience as something other than a human product.

We can start to explore issues concerning reality by identifying different theoretical positions, for example, nominalism and realism. In studying social phenomena, a person with inherently nominalist view of reality would emphasize the importance of the way in which the mind makes sense of the phenomena (a *subjectivist* approach). Reality is therefore more likely to be regarded as being socially constructed, that is, as humans we create and sustain structures as a result of our acting in the word. The nominalist queries the notion that there is any "real" structure to the world; structures are seen as being the creation of human interaction.

Realism (in an *objectivist* approach) to the study of social sciences, and therefore regards reality as a product of the world external to our mind. For realists, therefore, social structures are hard and unchangeable. There is no doubt exist independently of the individual's consciousness. They might argue, for instance, that we are born into a world that predates us, and when we die, structures continue to exist. The realist sees the social world in terms of an existence which is as hard and concrete as the natural world. We now turn to "problem" of knowledge.

3.2 Assumptions About Knowledge

The *epistemology* term which explains phenomena and understanding of issues concerning knowledge. It concerns what is acceptable knowledge. Such questions as "what constitutes truth?", "What are valid data?", "What are 'hard' data?" and "What are 'soft' data?" "Do we needed to support our statement with some kind of evidence?", "What kind of evidence (views of others, statistics, etc.)?". If we rise such questions, then we face with epistemological issues.

In social science nowadays, two main trends are more widely discussed: *positivism* and *social constructivism* [4, 9]. Saunders (2012) offer three categories such as positivism, realism, and interpretivism [1]. Further all these categories will be explained shortly.

Positivism relies on idea that social world exists externally, an objective view of the social sciences and set out to explain and predict by measured consistency and causality using objective methods.

In the last half of XX century scientists Berger and Luckman (1966), Watzlavick (1984), Shotter (1993) in Easterby-Smith et al. (2012) emphasized the peculiarities of social science and give focus on the ways people make sense of world especially through sharing they experiences with others, and *social constructivism* approach started to be used [9]. Best explanation of this approach would be that people determine "reality", not external factors.

Realism reflect philosophy which idea is—what we sense is reality: objects have an existence independent of the human mind [1]. It is similar to positivism.

Previously the term and specifics of *phenomenology* was analysed either. Since phenomenologists argue that people or situations can be understood only from an "internal frame of reference", that may include a detailed study of the person's biography, experiences and social context; for a group, it might include the detailed study of individuals' relationships and patterns of communicating [17]. As *phenomenology* concerns itself with exploring the subjective nature of the social world and, therefore, focuses on the particular rather than the general. The phenomenologist tries to examine this uniqueness of human beings. This is roots of *interpretivism*, which comes from *phenomenology* and *symbolic interactionism*.

Approaches to studying the social sciences are usually differentiated in terms being either positivistic or interpretivistic. Positivist approaches work on assumptions borrowed from the study of natural sciences. They therefore attempt to establish general rules and principles by using systematic techniques based on scientific methods [17]. The theories of organizational behaviour are often based on laboratory experimentation, control groups and have positivistic orientations.

Recently, there has been a growing amount of research that studies management by looking at managers in their "natural" context using such methods as inquiry, observation, in order to understand behaviour patterns, experiments in order to identify causes. The underlying assumption here is that people cannot be studied in a similar way to objects. Approaches that do this can be described as interpretivism.

One more term, which should be mentioned *axiology*. It is a philosophy that analysis judgements about values.

The comparison of research philosophies and management research presented by Saunders et al. (2012) reflects and explains the variety, helps to understand philosophies specifics (Table 1) [1].

3.3 Assumptions About Human Nature

The final set of assumptions deals with issues regarding the relationship between humans and their environment. The answer to questions "are we affected by environment?", "can we effect environment?", "are we social actors?" may reveal human nature.

If to believe that environment make effect on person, then we could say that it is *deterministic* approach. If to believe that person change society through the actions, then we could say that it is *voluntaristic* approach.

Determinists therefore regard humans as puppets rather than as actors. Social structures are seen as difficult, if not impossible, to alter, and human behaviour is seen as being determined by the environment. *Voluntarists*, regard humans as social actors who have the potential and the ability to influence and change their environment [17].

Table 1 Comparison of research philosophies and management research [1]

	Pragmatism	Positivism	Realism	lnterpretivism
Ontology: the researcher's view of the nature of reality or being	External, multiple, view chosen to best enable answering of research question	External, objective and independent of social actors	Is objective. Exists independently of human thoughts and beliefs of or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple
Epistemology: the researcher's view regarding what constitutes acceptable knowledge	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data	Only observable phenomena can provide credible data, facts. Focus on causality and law-like generalizations, reducing phenomena to simplest elements	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations, which are open to misinterpretation (critical realism). Focus on explaining within a context or contexts	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions
Axiology: the researcher's view of the role of values in research	Values play a large role in interpreting results, the researches adopting both objective and subjective points of view	Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Research is value laden; the researcher is biased by worldviews, cultural experiences and upbringing. These will impact on the research	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective
Data collection techniques most often used	Mixed or multiple method designs, quantitative and qualitative	Highly structured, large samples, measurement, quantitative, but can use qualitative	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in depth investigations, qualitative

Table 2 Deduction, induction and abduction: from reason to research [1]

	Deduction	Induction	Abduction
Logic	In a deductive interface, when the premises are true, the conclusions must also be true	In an inductive interface, known premises are used to generate untested conclusions	In an abductive interface, known premises are used to generate testable conclusions
Generalizability	Generalizing from the general to the specific	Generalizing from the specific to the general	Generalizing from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or hypothesis related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

In summary, an awareness of methodology can help the decision-maker such aspects as: assumptions concerning reality and knowledge, in order to recognize the validity of other data, and evaluate other perspectives and methodologies, so as to make judgements based on more informed research, in order to take action based on examination leading to favourable outcomes.

3.4 Research Approaches

Inductive, deductive and *abductive* approaches employed when we formulating research question and objectives of research (see Table 2).

If we attempt to look at particular issues or problems with a view to coming up with findings that can be generalized, we are reasoning and acting *inductively*. If, for instance, we note from our observations that the female managers we know show good judgement in their decision-making, we might generalize that women generally make good decision-makers. We begin from specific observation and end with a general conclusion. Inductive approaches to research, therefore, are those that move from the particular towards the general. When we come across a female manager who shows poor judgement, we may start to modify our theory. Induction

would criticize deduction for constructing right methodology that does not allow alternative explanation. Using inductive approach in research probably will lead to more attention to context in which events happened.

Deductive approaches begin with the general and work towards the particular. Its origins lies in natural science. If we begin with a general rule, law, principle or hypothesis, and try to apply or test it in specific contexts, are reasoning and acting deductively. Taking the example above, if we start from a general view that female managers make good decision-makers, and attempt to test this out in some systematic way, we are acting deductively. We may attempt to set up a hypothesis and test it by applying it to particular situations [17]. Blaikie (2009) lists six steps for deductive research [21]:

1. Put forward idea, hypothesis or set of hypothesis to form a theory.
2. Using literature sources deduce testable propositions.
3. Examine logic of the arguments with existing theories to see if it offers an advance in understanding. If it does, than continue.
4. Test premises by collecting data to measure concepts or variables and analysing it.
5. If the results are not consistent with the premises (the test fail!), theory should be rejected or modified and process restarted.
6. If the results of the analysis are consistent with the premises then the theory is corroborated.

Speaking about main features of the deduction process, such aspects should be noted: in order to ensure reliability **highly structured methodology** should be used; concepts need to be **operationalized** (facts tested usually quantitatively); principle of **reductionism** used (problem reduced into simplest elements); and **generalization** (sufficient sample size).

Abduction method combining induction and deduction approaches back and force. This is what often happens in business, management, and economic research.

3.5 Other Philosophies

In previous chapters' main philosophical approaches, which are important in business, management and economic research, are discussed. However, more philosophical positions exist, which proposed by different schools of thought, and which should be mentioned at least shortly: *critical theory, feminism, hermeneutics, postmodernism, pragmatism, structuration theory, critical realism*.

Critical theory. Origins: Frankfurt School, Habermans (1970), in Easterby-Smith et al. (2012) [9]. Concept: Identified clear difference between social sciences (based on communicative experience) and natural sciences (based on sense experience). In research of natural science used one-way data collecting methods, in social sciences usually it is two way communication and data collection methods. Main idea is that jut via communication it is possible become efficient. In addition, it was emphasized

that knowledge determined by interests, and they are presented by certain people (leaders with strong personality) who determines what is "true".

Feminism. Concept: idea and concept lies relying on idea that women perception, opinion and participation in science were undervalued. It is emphasized that it is important to understand behaviour from internal aspects, like woman themselves. Importance of such issues as power dynamics and gender differences raised as a question.

Hermeneutics. Origins: Germany, protestant groups in 17th century. Most known Gadamer (1989), Ricoeur (1981), in Easterby-Smith et al. (2012) [9]. Concept: Most attention paid to text interpreting (written and spoken, which can be recorded). In business and management research this concept can be used in analysis of documents, reports).

Postmodernism. Origins: term used since 1926 in library science, more academic attention paid after Jean-Francois Lyotard's (1984) publication, in Easterby-Smith, Thorpe, and Jackson (2012) [9]. Concept: Organization interpreted as flexible and changing, important are visible elements of organization, informal processes of decision making and tacit knowledge.

Pragmatism. Origins: 19th century W. James and J. Dewey. Concept: In the social world there is no pre-determined theories or frameworks that shape knowledge and understanding. Any meaning structures, which get developed, must come from the lived experience individual [9].

Structuration theory. Origins: Anthony Giddens (1984), in Easterby-Smith et al. (2012) [9]. Concept: Developed idea of "duality of structure". Bonds between social structure and social actions emphasized. Low of science and social science differences pointed out, like in first case universality emphasized, in second case context in which everything happens become extremely important. In business and management it example can be understanding relations between employees and organization.

Critical realism. Origins: Last two decades. Concept: it is compromise between positivism and constructionism. It suggested to start with realist ontology and incorporate realist thread. Key features is the idea of structured ontology, existence of causality, many mechanisms do not work for ordinary people and employees.

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Planning the Research

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1 Introduction

Nowadays, there are myriad of resources offering significant information on research methodology, and providing different approaches, different concepts, and different techniques. However a main question remains: How to convey a fit methodological approach that would help researchers create a scientific research and put in place a procedural knowledge that describes the different steps involved?

This chapter discusses key ideas in research planning and provides spotlights on research topic, describes the crucial elements involved in the identification of research problem and explains what constitutes an effective critical literature review.

2 Defining the Research Process

The research has its own language and exploits a proper vocabulary that occupies a large consensus in the scientific community. However the choice of concepts, methodology and approaches are specific to researcher; it is rather a state of mind.

The conceptual framework used in this study is based on reviewing foremost literature with a holistic view as presented in the below graphical form the Fig. 1.

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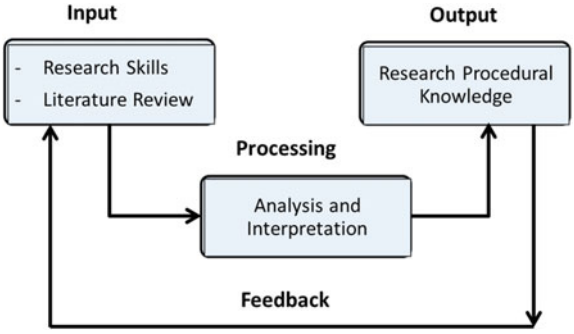

Fig. 1 The conceptual framework with a systemic approach

The most important point for a researcher to start with, is to conceive a research problem and to elaborate a plan that justifies the techniques and tools applied in order to acquire the targeted information. Once the methodology is defined, the researcher proceeds with the data collection and analysis and then, the interpretation of results, and completes the study with the dissemination of information and outcomes.

This chapter starts with the definition of certain terms that are commonly employed in research before describing the research process and the related activities.

2.1 Basic Terminology

Clear and consistent terminology plays an important role in research quality. However some basic terms are not always consistently defined by authors. Indeed, a good comprehension of the "basic terminology" is a prelude to the commencement and planning of every research.

To avoid any confusion, the following basic terms with their corresponding definitions are used throughout this chapter.

Research Topic: is a wide and broad area of Interest. A specific research topic can generate several research problems. "Research topic" and "research problem" are often used interchangeably.
Research Problem: is a problem within a broad topic area. It is an issue that needs a solution or a situation to be enhanced or a difficulty to be defeated.
Problem Statement: conveys the problem to be tackled and highlights the need for a study.
Research Purpose: is a "declarative statement" that pinpoints the focus and portrays the overall target of the study.
Research Questions: are defined as "Interrogative statements that narrow the purpose statement to specific questions that researchers seek to answer in their study" [1].
Research Hypothesis: "A hypothesis is the researcher's prediction of the relationship that exists among the variables being investigated" [2].

Research aims or Objectives: "The specific accomplishments the researcher hopes to achieve by conducting the study. The objectives includes obtaining answers to research questions or testing research hypotheses but may also encompass some broader aims" [3].
Data versus Information versus Knowledge: data refer to facts and raw material where information is processed and analysed data, it is data put in context; knowledge refers to the subsequent assimilation and discernment of that information. Knowledge is a combination of contextual information, know-how, values and rules.

2.2 The Beginning: Planning the Research

> If you don't know where you are going, you'll end up someplace else.
>
> **—Yogi Berra (May 12, 1925–September 22, 2015)**

> The only person, who succeeds, is the person who is progressively realizing a worthy ideal. He's the person who says, 'I'm going to become this' and then begins to work toward that goal.
>
> **—Earl Nightingale (March 12, 1921–March 28, 1989)**

Planning preoccupies the first position in the research process. It is the center around which all research activities progress. According to Urick (1943) "planning is a mental predisposition to do things in orderly way, to think before acting and to act in the light of facts rather than guesses" [4].

The typical research planning approach starts with defining the problem, then selecting a research methodology and continues with the development of a research design. The researcher takes to the field, collects data, examines and interprets the result, and finally writes the study report.

In this regard, we are advocating the reverse: a different prominent approach to traditional planning principles is "Backward Planning" where the researcher needs to think from different perspective. The idea is to start with the end—the ultimate goal—and then move backwards from there to develop the plan and choose the efficient actions that are most likely helpful to fulfill the desired results. By doing this, the researcher can mentally prepare himself for success and map out specific milestones that need to be achieved.

Covey (2004) said that to "begin with the End in Mind means to begin each day, task, or project with a clear vision of your desired direction and destination, and then continue by flexing your proactive muscles to make things happen" [5]. This "habit 2", as stated by Covey, is a self-mastery activity based on the assumption that everything is created twice. The "first" creation is a virtual one crafted in our mind, and the "second" is a physical, real one—action plan. Therefore, and in order to be more productive, the researcher needs to assess the situation from the early beginning, and create a mental mission statement that helps him putting the goal in focus in the light of the triple constraints: "time, budget and data quality".

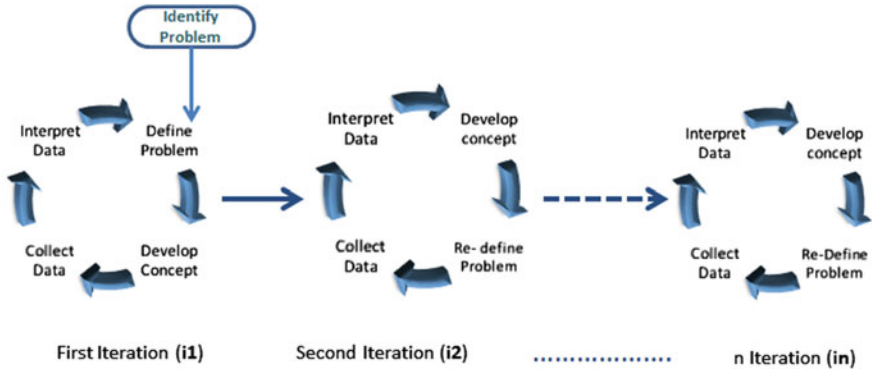

Fig. 2 Research as a spiral pattern

Furthermore, setting a personal goal is an imperative step in the research planning. Once expected outcomes are plunged in the mind, the thoughts start triggering motivation and thus driving efforts toward the accomplishments.

This orientation pushes the researcher into the respect of the "Research Process" and the adherence to the pre-planned steps as demonstrated in the graphic form in the conclusion paragraph (Fig. 2).

2.3 Research Process: Phases and Steps

Research is broadly conceived as a dynamic process that needs to be actively planned and monitored. The research evolves as activities progress and the elements of process interact and impact on one another.

- ISO 9000:2015 (en), item 3.4.1, defined the "Process" as a "set of interrelated or interacting activities that use inputs to deliver an intended result" [6].
- Juran (1992) identified the process as "a systematic series of actions directed to the achievement of a goal" [7].
- Walliman (2011) described the process as "a series of stages that are interrelated and are sometimes revisited in an iterative fashion during the project" [8].

Although the research steps are presented throughout this chapter in chronological order, the process by itself is not linear and straightforward as it is usually illustrated. As cited in Gill and Johnson (2010), "*the process is not a clear cut sequence of procedures followed by a neat pattern, but a messy interaction between the conceptual and empirical world*" [9]. Some phases may overlap each other or occur concurrently. Some are interrelated and frequently revisited in an iterative approach during the study. According to Leedy and Ormrod (2015) research is "by its nature, *cyclical* or more exactly, *helical*" [10]. The questions lead to data collection which leads to

Table 1 Overview of the research process at a glance

Development aspects	Definition
1. The theoretical or Conceptual aspect	Formulating the scientific problem, reviewing and criticizing literature, and determining the research expectation
2. The design and Planning aspect	Selecting a research model, developing analysis procedures, setting the sampling and data gathering plan
3. The empirical aspect	Collecting and preparing data for analysis
4. The analytic aspect	Analyzing the data and interpreting the results
5. The dissemination aspect	Communicating the results

interpretations and then to new problems; the questions raised and the knowledge acquired at each turn provide the center for the next round.

Neuman (2008) describes the researcher process as an ongoing endeavor that builds on past research and performs future research [11]. According to him, the process runs interactively in seven steps, with steps running into each other and influencing each other. Furthermore Cameron and Price (2009) introduced the metaphor of research process as tornado "you may feel you are in the grip of strong forces which shift you from one part of the research field to another almost against your will" [12]. Figure 2 highlights the spiral development model which follows the philosophy of iterative development.

There are several ways to conceive the research process. We are considering the approach as described by Whittemore and Melkus [13] and which consists of five development phases:

1. Conceptual or theoretical
2. Design and Planning
3. Empirical
4. Analytic
5. Dissemination.

Table 1 summarizes the different development aspects involved in the research process.

Following are conventional steps in the research process:

– The consideration of ethics throughout the research process
– The development of the research question
– The search and evaluation of the literature
– The choice of methodology and research design
– The preparation of the research proposal
– The gaining access to data with related authorization
– The development of samples (strategies and design)
– The implementation of the pilot study

– The execution of data collection and data processing
– The realization of data analysis and interpretation
– The dissemination of results
– The Implementation of the research.

Many authors have described the research process as iterative, circular, or recursive with different number of phases or stages and different names or tags, as shown in Table 2; however whatever terminology is used, the process core elements remain the same.

Note that the research life spans into time segments. This chapter refers to these time segments as phases with a stage as subset of phase, others refer to these time segments as stages.

The adherence to the "Overview of Research Process" should allow efficiency improvement of the "system approach to researching".

2.4 System Approach to Researching

A system is defined in ISO 9000:2015 item: 3.5.1 as a set of interrelated or interacting elements [6]. According to Senge [14] a system is set of variables that influence one another. Bertalanffy (1969) defines the system as a set of components that work together for the overall objective of the whole [15].

Therefore, from a system perspective, a research could be considered as a system defined by the association of processes and their interrelations. The outputs from one process might be the inputs into other processes within the network. From identification of research problem to the delivery of the research report, the processes interact, exploiting resources, creating results and adding value to the circular chain of activities.

In this regard, embracing a holistic approach means the researcher views all study choices as interrelated and thus creates a mental model to manage the research effectively.

This system itself, applied in a scientific and research environment would be able to develop and to refine the research problem and the research hypothesis.

3 Developing and Refining the Research Problem

> If any student comes to me and says he wants to be useful to mankind and go into research to alleviate human suffering, I advise him to go into charity instead. Research wants real egotists who seek their own pleasure and satisfaction, but find it in solving the puzzles of nature.
>
> **—Albert Szent-Gyorgyi (Sep 16, 1893–Oct 22, 1986)**
>
> You have to be burning with an idea, or a problem, or a wrong that you want to right. If you're not passionate enough from the start, you'll never stick it out.

Table 2 Research process: phases' names proposed in different sources

Author / Phase/stage	Susman and Evered [36]	Kember [37]	Polit and Beck [3]	Bickman and Rog [38]	Parahoo [32]	Brink et al. [39]
Phase I	Diagnosis	Planning	The conceptual phase	Planning: – Definition – Design/plan – Implementation – Reporting/follow-up	The identification of the research question	The conceptual phase also called 'planning' phase
Phase II	Action planning	Action	The design and planning phase	Execution	The collection of data	The empirical phase
Phase III	Action taking	Observation	The empirical phase		The analysis of data	The interpretive phase
Phase IV	Evaluating	Reflection	The analytic phase		The dissemination of findings	The communication phase
Phase V	Specifying learning		The dissemination phase		The dissemination phase	

—Steve Jobs (February 24, 1955–October 5, 2011)

The starting point of the research is a situation that raises questions, discomfort, or exasperation and calls for an explanation or at least a better understanding. The subject of study corresponds to the aspect of the problem that research is seeking to elucidate. In order to formulate this subject, we have to select a pertinent topic that refers to the problematic situation. Therefore, the identification of the research problem starts by selecting the research topic which is considered as the cornerstone on which everything else lies; consequently, it is of paramount importance to choose carefully [16].

The research question and hypotheses are derived from the research problem and constitutes the bridge between the conceptual and design phases.

3.1 Spotlights on Research Topic

Research process often requires persistence and can be tedious and time-consuming and even may lead sometimes to frustration. For this reason, it is critical to consider areas of study that the researcher is both passionate and curious about. Curiosity and passion are strong stimulus and fundamental motivators that supply the researcher with the necessary fuel and energy to persevere, to maintain enthusiasm for the study and stay resilient through the challenges.

Suitable topics for research emerge from a variety of sources including personal interest, professional experience, a recurring difficulty, program evaluation, theory testing, prior research. According to Johnson and Christensen (2013) past educational research is the most input resource of research ideas since the important studies usually generate more questions than answers [17].

For Evans (2007), "there are three simple strategies for evaluating a potential research topic" [18]:

– "(1) Does the topic elicit interest and curiosity?
– (2) Is the topic worthwhile?
– (3) Is the topic do-able?"

Following are critical attributes of a good research topic:

Interesting: The topic should excite the imagination of the researcher. According to Johnson (2011) the subject should include something that the researcher would genuinely like to examine in depth, something in which researcher will not lose interest while undertaking the study [19].

Novel and Worthwhile: The researcher should seek under-occupied niche for potential studies.

The topic should be suitable for research and should be able to provide fresh and creative insights into the subject. For Evans (2007), it is critical that the researcher picks a topic that is worthwhile. According to him, poor science is unethical; "it is unethical to ask people to participate in the study if it has little or no likelihood,

because of poor conceptualization and design, of producing meaningful results or furthering scientific knowledge" [18].

Feasible and Fundable: The topic should be affordable in terms of time, money, equipment, data access, and expert knowledge.

Relevant: The topic should relate clearly to the idea provided by the organization, tutor etc. Furthermore the topic should be relevant to scientific knowledge and future research directions.

3.2 Formulating a Research Problem

> Give me six hours to chop down a tree and I will spend the first four sharpening the axe.
>
> **—Abraham Lincoln (February 12, 1809–April 15, 1865)**

> The formulation of the problem is often more essential than its solution.
>
> If I had an hour to solve a problem I'd spend 55 min thinking about the problem and 5 min thinking about solutions.
>
> **—Albert Einstein (March 14, 1879–April 18, 1955)**

The research problem epitomizes the hub or the focal point of the study. Polit and Beck (2004) describe the evolving research problem, as a "creative process that depends on imagination and ingenuity where the problem by itself is a situation involving an enigmatic, perplexing or conflictful condition" [3]. For Burns and Grove (2005), the research problem is a worrying situation in need of solution, improvement or alteration [20]. According to Leedy and Ormrod (2015), the research problem "is the axis around which the whole research effort revolves…" [10].

The research problem plays a crucial role in directing and shaping the subsequent activities of the study. For Bryman (2008), defining the problem bears critical importance for the whole research process [21].

Any wrong step during the stage of problem identification could have extremely negative effects on the whole research process.

The following steps are recognized in identifying a research problem:

Step one: Selection of the research topic or the broad area of Interest to be investigated.

Step two: Study of the idea with a preliminary search on literature. This step interacts consistently with other steps.

Step three: Turning Topic into Preliminary Questions. The researcher identifies one or more potential problems by narrowing down the focus and generating questions from the selected topic. Afterward, the researcher narrows down the questions by eliminating those that are not researchable.

According to Brink and Wood (2001), researchable questions are:

– *Focused on fact not opinion*—answers will help to describe or explain a phenomenon
– "Now" questions—deal with current, significant issues
– *Relevant*—Generate useable information
– *Action oriented*—usually require you to do something and provide direction for the rest of the research process" [22].

Step four: Reviewing the relevant literature. The researcher will be able to identify what is known and what is not known about the research problem. Furthermore, a concise review of the literature will assist the researcher in identifying gaps and discrepancies that support the need for further study.
Step five: problem formulation: The researcher considers the potentially researchable questions and selects **one** to explore in more depth. The selection takes into consideration the following factors:

– The researcher interests
– The literature
– The problem feasibility study

Step six: Research purpose identification—the purpose of the study covers the aims/objectives the researcher seeks to achieve and not the question to be answered. The research purpose is generated from the research problem.
Step seven: Research Question Refinement. A research question is the kernel of a research system. It focuses the study, dictates the research design, determines the methodology, and guides all stages of investigation, analysis, and dissemination. The researcher generates a statement of the research question based on the specific question(s) that need(s) to be answered. Therefore, it is an extension to the research purpose statement.

To conclude, there are essentially two major steps involved in formulating the research problem, the first one is *absolutely* the understanding of the problem and the second one is the rephrasing of this problem into clear and meaningful terms, from a systemic and analytic point of view.

Hypothesis Formulation
The hypothesis is an element of research problem and a potential answer to the research question. It is "formulated" before conducting the study "a priori" [23], because it routes the design, analysis and interpretation of data. The hypothesis translates the research purpose into a clear prediction of the expected results.

Hypothesis Definitions

- "Hypotheses are single tentative guesses, good hunches—assumed for use in devising theory or planning experiments intended to be given a direct experimental test when possible" [24].
- "A hypothesis is a statement or explanation that is suggested by knowledge or observation but has not, yet, been proved or disproved" [25].
- "Hypothesis is a formal statement that presents the expected relationship between an independent and dependent variable" [1].

A good hypothesis is a clear and concise declarative statement that embraces the following conditions:

Is written in the present tense and stated in declarative form;

- Is straightly tied to the research problem;
- Is specific in addressing only one variable at a time (Each Hypothesis should address one and only one relationship between two variables). For multi-relationships, the researcher can specify multi hypotheses;
- Is explicit and concise in describing the relation between variables;
- Is testable by further investigation. To prove or disprove the hypothesis, the researcher should be able to complete an experiment and take measurements or assemble observations to see how the independent and dependent variables are related.

According to Bruke and Larry (2013), in quantitative study, the researcher typically states the specific hypotheses developed from the literature review before collecting the data whereas in qualitative study, the hypotheses are often progressively formulated as data are processed and as the researcher gains deep understanding of the study [26]; "they are grounded in the data and are developed and tested with them" [27].

The formulation of the hypothesis mainly varies with the kind of research conducted. A typical hypothesis consists of two parts: a prediction about the outcome of a scientific investigation and an explanation for why those results will occur. A good hypothesis is in the form of: If…then…because…

It should be noted that hypothesis formulations, problems definitions and research criteria necessitate in advance the illustration of the "Research Topic".

Ultimately, the hypothesis is more than a simple prediction. It is important because it directs the observations, describes a relation between variables and leads the researcher's reflections toward the appropriate solution of the research problem.

4 Critically Reviewing the Scientific Literature (Planning Literature Search Strategy)

If I have seen further than others, it is by standing upon the shoulders of giants.

—Isaac Newton (December 25, 1642–March 20, 1727)

A thorough literature review is an imperative step for the researcher since it helps him delimiting the research problem and enlightening the concepts that will be studied by taking into consideration the past research. According to Burns and Grove (2011), "re-search principally means searching again or examining carefully" [28].

4.1 Critical Literature Review

A literature review is a critical look and in depth interpretation and assessment of previous research relevant to the topic or problem being studied. Polit and Beck (2004) defined the research literature review as a written summary of the state of existing knowledge on a research problem [3]. According to Fink (2010), "a literature review is a systematic, explicit and reproducible method for identifying, evaluating, and interpreting the existing body of recorded work produced by researchers, scholars, and practitioners" [29].

Ideally, the literature review is seen as an iterative Information System reflecting the cyclical nature of Deming's PDSA (Plan-Do-Study-Act) wheel, or the so called "Model of Improvement". The cycle begins with the "Plan step"—Planning a search strategy, followed by the "Do step"—collect data, comprehend and apply, next comes the "Study step"—analyze, synthesize and interpret Information and then the "Act step" that blends the cycle by integrating knowledge generated by the entire process. This approach can be used to correct the goal, fine-tune methods or even reformulate a theory altogether. The repeated cycle with the iterative feedback–loop mechanism promotes continuous quality improvement in the research literature.

Nevertheless, from a holistic perspective, we consider the literature review as a system including four main components: (1) **inputs**, (2) **process**, (3) **outputs** and (4) **feedback**. The **inputs** consist of the sources that the researcher finds through searching the literature, the information technology including software and hardware and the investigator's analytical skills. The **process** is mainly the set of mental activities the researcher applies to collect, read, synthesize, analyze, interpret and critically appraise the available literature. The **output** is the written literature review. According to Grove et al. (2012), "the stages of literature review reflects a systems model", where the quality of the input and activities will determine the quality of output" [30]. However the authors omitted the critical component of the system which is the **feedback** loop in which outputs such as research outcomes and critical evaluations can also serve as input to future research (Fig. 3).

Critically reviewing a scientific literature entails strong logic, careful reasoning and objective point of view and must incorporate up-to-date references. Furthermore,

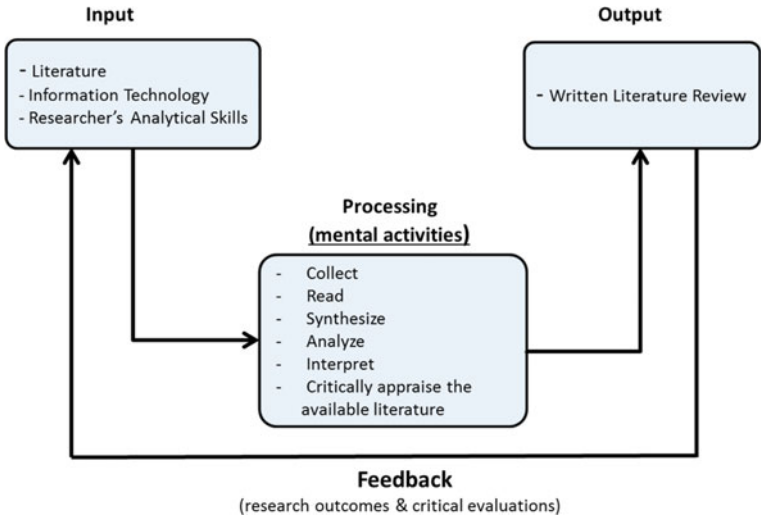

Fig. 3 A system approach to literature review

critically reviewing requires comparing and contrasting arguments on the given subject supported by valid evidence and/or theory.

Moreover, a critical literature review is a critical analysis and evaluation of previous research and findings including reasoned judgments regarding the overall value of other's work to the study being undertaken; consequently it is an assessment of strengths and weaknesses of other people's ideas and an opportunity to design better research by bridging the gap identified in previous studies. As noted by Jankowicz (1995), "Knowledge doesn't exist in a vacuum and your work only has value in relation to other people. Your work and your findings will be significant only to the extent that they're the same as, or different from, other people's work and findings" [31].

Therefore, each stage of the literature review is critical to generating a high-quality literature review that contributes drastically to the advancement of knowledge and to the sustainable development of research goals.

There are two approaches to critical review: a deductive approach and an inductive approach.

A deductive approach starts with a hypothesis, or a general statement, and studies the possibilities to attain a logical conclusion. It moves from theory, to hypotheses, to data, to confirmation. This approach uses literature to identify ideas and theories that will be tested using the processed data. Deductive approaches are more commonly associated with quantitative research.

An inductive approach explores the data then develops theory which will be related to the literature. It goes from data, to pattern data, to tentative hypotheses, to theory. Inductive are generally associated with qualitative research.

4.2 Planning Literature Search Strategy

The literature search is the vital element and key aspect of defining and refining the research focus.

The purpose of planning a search strategy is to find good quality literature and thus helping the researcher critically evaluating the research literature. There are a variety of search strategies proposed by different authors; we recommend the following one:

1. Select a software tool to manage references and citations. For examples: Zotero, Mendeley, etc.
2. Consider the 'Paper-and-Pencil Approach' to make notes and record the thoughts.
3. Refine the topic and write down the research question.
4. Identify the type of literature e.g. primary research in journal articles, systematic reviews, Peer-reviewed journals, research reports, conference literature, books, etc.
5. Identify the sources of relevant information—databases, Google Scholar™, individual organizations' websites, library catalogues etc.
6. Select appropriate Databases. Nowadays, literature searches are undertaken most commonly using computers and databases management systems to access and manipulate vast quantities of information that can be retrieved more easily and quickly than using a manual search. Following are some databases that may be of interest to business research:

   – ERIC, the Educational Resources Information Center
   – EBSCO, Academic Search Elite
   – JSTOR, academic journals and other scholarly content
   – ProQuest(ABI/INFORM) is a business research database
   – Elsevier (ScienceDirect)
   – ACM (Digital Lib)
   – LexisNexis Academic, Etc.

7. Identify key terms/key concepts in the research question. Use keywords and **synonyms**: search terms that are logical and relevant to the search.
8. Consider the scope of topic and search restrictions. Framing the research question by making decisions about the inclusions and exclusions in order to apply efficient searching with key terms.
9. Record the search terms used, the databases searched and the relevant results retrieved.

Search tips for databases include:

– Form a **Boolean** search with the research terms or keywords. There are three Boolean operators (**and, or, and not**).
– (**and &, +"**) to narrow results
– **OR**: to broaden results.
– **NOT**: to exclude terms.
– **WITH, SAME** (**proximity**): to locate results in same sentence or paragraph.

– **or? (truncation)**: to catch all forms of a word.
– **wild card**: to deal with different spellings and plurals. The usual wildcard symbol is a question mark.

5 Formulating the Research Design

> Recognizing the need is the primary condition for design.
>
> —**Charles Eames (June 17, 1907–August 21, 1978)**

> I keep six honest serving men, (they taught me all I knew), and their names are: what and how and when, and how and where and who.
>
> —**Rudyard Kipling (December 30, 1865–January 18, 1936)**

During the conceptual phase, the researcher tackles the core of the study embodied by the research problem and converses his/her aims in research reports as statement of purpose, research questions and/or hypotheses. Nevertheless, during the design phase, the researcher deliberates decisions on methods and data collection techniques driven by the nature of the research problem. Therefore, the research design is a crucial step as it represents the master plan, the blueprint or the fundamental bridge for connecting the conceptual research problem to the relevant empirical research.

Parahoo (2014) defines the research design as "a plan that describes how, when and where data are to be collected and analyzed" [32]. According to Polit and Beck (2004) the research design is "the overall plan for addressing a research question, including specifications for enhancing the study's integrity" [3].

The research plan must blend the components of the research and articulate efficiently and effectively, the trilogy of the research project, including time, money and scope. Strategies to ensure the ethical performance of study must also be incorporated into this plan.

The research design can serve one or more of the following purposes: Exploration, Description, Explanation, Prediction, Evaluation and History. The Table 3 summarizes the three main types of research design:

The formulation of the research design is imperative since it communicates information about key aspects of the study, which can differ for qualitative, quantitative, and mixed methods. Leedy and Ormrod [10] suggest ten points as guidelines for deciding on the best appropriate method. Table 4 identifies seven main criterion to be considered in the selection process.

An overview of these designs is shown in the Table 5. To notice that others have called these designs "*approaches to inquiry*" [33] or "*strategies of inquiry*" [34].

The following steps are involved in formulating a research design:

– Delineate the information required for the accomplishment of the study.
– Identify the source of information; Who is appropriate to provide the necessary information and Characteristics of the target population.

Table 3 Main three types of research design at a glance

Exploratory (discovery)	Descriptive (relationships)	Causal (cause and effect)
This is the most appropriate research design for the projects that are addressing ambiguous problem which is not very well known or there are few existing research studies on the related topic (unaware of problem). Usually, the researcher conducts this type of research to identify the reasons behind a certain phenomenon and how it occurs. Some of commonly collection methods include: case studies, interviews, Secondary data analyzed in a qualitative way, literature search and focus group discussion.	This type of research is recommended when the characteristics of the target population are clearly recognized (aware of problem). Usually, the researcher conducts this type of research to identify and classify the elements or characteristics of the subjects and to describe the attributes of groups relevant to the problem under study The most commonly used data collection methods are: Survey, observation, secondary data analyzed in a quantitative way, simulation and panel method	This type of research aims at finding out the cause-effect relationship between two or more variables (problem clearly defined), also to understand which variables are the cause "independent variables" and which variables are the effect "dependent variables" of a given phenomenon It is a highly structured design, and there is a hypothesis right at the start of the study. The most commonly used data collection methods are: Field Experiments and Lab Experiments

Table 4 Research method—selection ground rule

1. The personal comfort with the method
2. The type of the research question
3. The extensiveness of the related literature
4. The depth of what we wish to discover
5. The amount of time available for conducting the study
6. The extent to which we are willing to interact with the people in our study
7. The writing skill

Table 5 Alternative research designs

Quantitative	Qualitative	Mixed methods
– Experimental designs – Non-experimental designs, such as surveys	– Historical/narrative research – Ethnographies – Phenomenology – Grounded theory – Case study	– Convergent – Explanatory sequential – Exploratory sequential – Transformative, embedded or multiphase

- Clarify the "why" behind choosing specific research methods and demonstrate that these research methods are appropriate to the research.
- Specify the means of obtaining information; identify the best appropriate procedures, techniques and instruments that meet data collection needs. According to Leedy and Armord (2015), there are five questions that need to be answered in order to bring the process into focus [10]:

  1. "What data are needed?
  2. Where are the data located?
  3. How will the data be obtained?
  4. What limits will be placed on the nature of acceptable data?
  5. How will the data be interpreted?"

- Specify the time horizon; whether the design will be "cross-sectional-data are collected at one point in time" or "longitudinal-data are collected at two or more points in time over an extended period".
- Specify the "Measurement and Scaling Procedures".
- Consider the constraints and ethical issues.
- Construct a "Questionnaire" or consider an alternative technique.
- Specify the "Sampling Process and the Sample Size".
- Develop a Plan for "Data Analysis".

To wrap up, the researcher must prepare a protocol or an action plan that incorporates the above activities into a flexible and coherent structure; thus, imposing discipline, providing contingency, allowing monitoring and correcting deviations and mitigating the risk. The plan should explicitly indicate costing information including the number of days of work and other costs related to each stage of research design. The plan must also contain the statistical methods to be used in processing the data.

Therefore, the protocol is a critical component of the research design since it allows the researcher and all the people involved, to scrutinize the study's progress and assess its outcomes.

6 Processing and Analysis of Data

> In God we trust. All others [must] have data.—Bernard Fisher.
>
> —Siddhartha Mukherjee (July 21, 1970)
>
> Not everything that can be counted counts and not everything that counts can be counted.
>
> —**Albert Einstein**, **(March 14, 1879–April 18, 1955)**

Everything is data, but not everything is information. Turning data into information is the foremost function of data processing and analysis.

The data processing is a crucial activity that involves meticulous planning. From a technical perspective, **data processing** includes three main operations:

- Data integration.

– Data cleansing or scrubbing and
– Data transformation.
– Data integration is a process in which separate or heterogeneous data is gathered and combined as an incorporated structure and form.
– Data cleansing is the process of editing the collected data, by detecting and removing of erroneous, incomplete, duplicated or improperly formatted ones. This step is critical to verify the validity and reliability of data. Analyzing data that has not been carefully screened for problems can generate highly misleading result.
– Data transformation is the process of coding, classification and tabulation of data so that, they are suitable for analysis.

The **data analysis** is the process of data modeling and evaluating by systematically applying statistical and/or logical methods and techniques. The purpose of data analysis is twofold:

– To convert data into information in order to answer the research question and test the hypotheses.
– To help finding effective trends, patterns and relationships among the variables.

Notice that the researcher may refer to software tools and techniques such as data mining to systematically manage the above operations. These tools usually include rules and algorithms to facilitate and assist the researcher throughout data processing and analysis phases.

According to Chung and Gray (1999), "the objective of data mining is to identify valid novel, potentially useful, and understandable correlations and patterns in existing data" [35].

Two types of data analysis are recognized: Descriptive and inferential. Descriptive statistical analysis is used to find answers to research questions, while the differential statistical analysis is used to test hypotheses. The Table 6 provides in a nutshell, the difference between descriptive and inference statistics.

Once data are analyzed, they should be interpreted. Interpretation consists to attach meanings to the data. Often the same data can be understood in different ways, therefore, the researcher needs to listen to the interpretations coming from different people before the final evaluation of the information and before jumping to the conclusion.

Finally, the researcher concludes his/her study by summarizing the detailed results in general statements with explanations on findings compared to the results of past research.

It is also imperative to wrap up the study with suggestions for future research that will improve the outcomes and further contribute to the literature on a topic.

Table 6 Descriptive versus inference statistics

Descriptive statistics	Inference statistics
– Used to find answers to research questions	– Explicitly designed and used to test hypotheses
– Studies the sample characteristics – Does not explain or interpret	– Generalize from samples to population – Deeply analyzes the statistical data and observations – Assesses strength of the relationship between independent 'causal' variables, and dependent 'effect' variables
– Gives a description about a sample – Offers a summary, overview and description of data under study (organize, summarize, simplify and presentation of data)	– Based on the laws of probability – Predicts and infers about a much larger data/population
– The conclusions cannot be made beyond the given data	– Aims to depict conclusions about a population – The predictions can be calculated on the basis of the parameters of the given population, "it does not matter how big the population is"
– Deals with small samples which makes possible producing results without errors	– Takes whole population for drawing conclusions "which may not have the extent of required accuracy"
– Deals with central tendency and spread of the frequency distribution	– Deals with more details; hypothesis tests and confidence interval are studied
– The measures (mean, median, and mode) are numbers	– The measures are not always exact numbers
– Common types include but not are limited to: – Organize data: – Tables (frequency distributions and relative frequency distributions) and graphs – Summarize data: – Central tendency (mean, median and mode) – Variation (range interquartile, range) – Variance and standard deviation	– Common types include but not are limited to: – One sample test of difference/one sample – Hypothesis test – Confidence interval – Contingency tables and Chi Square statistic – T-test or Anova – Pearson correlation – Bivariate regression and multivariate regression

7 Conclusion

This chapter has introduced a methodological approach that can help researchers putting together the pieces of information related to the different phases of research process and creating an understanding of the whole and what creates a scientific research.

Furthermore, a various key processes have been examined through a systemic approach, all research elements are considered to be related to one another, notably the development of research problem, the critical review of the literature, the design phase along with the data analysis and interpretation. The research planning proposed

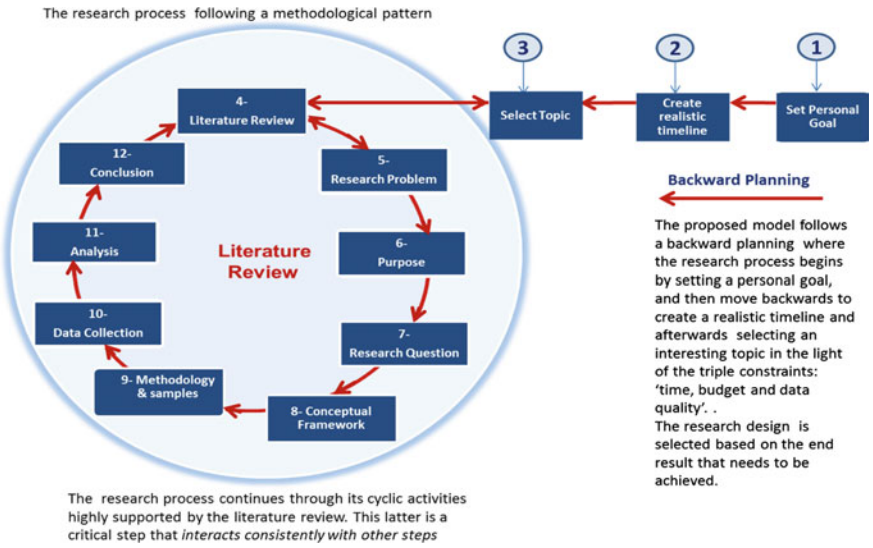

Fig. 4 Research planning—the proposed conceptual model

model has focused on backward planning as a key approach to stimulate motivation and increase the researcher's efficiency and effectiveness as described in Fig. 4.

Nevertheless, this chapter didn't tackle the main aspects of recent technology applied currently in research. This latter continues to exert a strong impact on research and its environment; new software and hardware emerge, making the research a more challenging and more enjoyable process. Therefore, further research would be needed to identify and evaluate what technology types and intervention into the research planning, would improve and expand this procedural knowledge and help researcher reaching the goal with minimum cost and maximum quality.

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Basic Research Methods

Jurgita Raudeliūnienė

1 Different Research Types

Many scientists state that research design is related to the identification and formulation of the scientific or practical business management problem [1–16]. Scientists distinguish three types of research [3]:

- *Exploratory*—aims to fill missing gaps and insufficiently explored areas in particular fields;
- *Descriptive*—aims to elaborate current or historical topics with a view to deepening understanding of them (research methods as questionnaires, observation);
- *Causal*—includes gathering empirical data for determination why something happens.

According to Sarstedt and Mooi (2014) ambiguous problem is related with exploratory research design, somewhat defined problem related with descriptive research design and clearly defined problem that is related with causal research design. Each research design has different uses and requires the application of different analysis techniques [17].

Sarstedt and Mooi (2014) state that the objective of exploratory research is to explore a problem or situation [17]. Panda et al. (2015) underline that the chief purpose of exploratory research is to reach a better understanding of the research problem. This includes helping to identify the variables, which should be measured within the study. If there is little understanding of the topic it is impossible to formulate hypotheses without some exploratory studies [18].

According Sarstedt and Mooi (2014) exploratory research can help to formulate problems exactly or structure them, generate hypotheses and develop measure-

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ment scales [17]. For example, depth interviews, focus groups, projective techniques, observation studies and ethnographies are often use to achieve this.

Depth interviews consist of an interviewer asking an interviewee a number of questions. Depth interviews are unique in that they allow discerning on a one-to-one basis and foster interaction between the interviewer and the respondent.

Focus groups are usually established by 4 or 6 participants, which are led by moderator, who discuss a particular subject. The key difference between an interview and a focus group is that the focus group participants can interact with each other providing insight into group dynamics (for example, "What do you mean by…?", "How does this differ from…").

Projective techniques are motivating people to present their thoughts with means of pictures, words, or other stimuli, to which they are responding the best.

Observational studies are frequently used to refine research questions and clarify issues. It requires an observer to monitor and interpret participants' behavior.

Ethnographies raise originally from anthropology. A researcher interacts with consumers over a period to observe and ask questions.

By the authors Zikmund et al. (2013) the descriptive research is described as characteristics of objects, people, groups, organizations, or environments. This type of research tries to "paint a picture" of a given situation. Descriptive research seeks to determine the answers to who, what, when, where, and how [19].

Sarstedt and Mooi (2014) underline that descriptive research is all about describing certain phenomena, characteristics or functions. It can help describe customers or competitors, understand market size, segment markets and measure performance [17].

According to Panda et al. (2015) descriptive research is concerned with describing market characteristics and/or marketing mix characteristics [18]. Typically, a descriptive study specifies the number and size of market segments, the alternative ways in which products are currently distributed, listing and comparison of the attributes and features of competitive products, etc. This type of study can involve the description of the association extent between variables. The principal difference between exploratory and descriptive research is that, in the case of the latter, specific research questions have been formulated before the research is undertaken. When a descriptive research is conducted, the researcher must already know about the research problem, perhaps because of a prior exploratory study, and is in a position to clearly define what he/she wants to measure and how to do it.

Kampen and Tamas (2014) find out that descriptive research attempts to identify and better understand objects of interest and aims to produce an account about what is exploratory research. It tries to find correlational or causal relationships between objects that have been described [20].

Zikmund et al. (2013) state that causal research seeks to identify cause-and-effect relationships. When something causes an effect, it means that brings it about or makes it happen. Exploratory research builds the foundation for descriptive research, which usually establishes the basis for causal research [19].

Sarstedt and Mooi (2014) find out that causal research provides exact insights into variables relate that can help uncover causality and understand the performance

effects of marketing mix elements [17]. Causal research is used to understand the effects of one variable (for example, the wording in advertising) on another variable (for example, understanding as a result of advertising). It provides exact insights into how variables relate and may be useful as a test run for trying out changes in the marketing mix. The key usage of causal research is to uncover causality. Causality is the relationship between an event (the cause) and a second event (the effect), when the second event is a consequence of the first. According to the Authors, causality needs to meet four requirements: relationship between cause and time, time order, control for other factors and availability theory. Experiments are a key type of causal research and come in the form of either lab or field experiments. Lab experiments are performed in controlled environments to gain understanding of how changes in one variable (called stimulus) cause changes in another variable. For example, substantial experiment is conducted to gain understanding of how changing websites helps people navigate better through online stores and thereby increasing sales. Field experiments are experiments conducted in real-life settings where a stimulus (often in the form of a new product or changes in advertising) is provided to gain understanding of how these changes affects sales.

According to Panda et al. (2015) causal research deals with the "why". This means, that there are occasions when the researcher will want to know why a change in one variable brings about a change in another. If he/she can understand the causes of the effects observed, then our ability to predict and control such events is increased [18].

Many scientists on methodological issues find it helpful from one side to distinguish between *quantitative* and *qualitative* research and from another side problematic because many researchers combine quantitative and qualitative methods and elements.

Veal (2005) states that quantitative approach research involves the gathering and analysis of numerical data and the data might be derived from questionnaire based surveys, from observation or from secondary sources [21]. The qualitative approach research is not concerned with this sort of statistical analysis, because the approach is based on belief in the value of a full and rounded understanding of the experiences and situations of a few individuals. The methods used to gather qualitative information include observation, informal, unstructured and in-depth interviewing and participant observation. Research, in which people study groups use non-quantitative anthropological approaches, is often referred as ethnographic.

The qualitative research focus and displays the following characteristics [22]:

- It is exploratory in nature,
- It uses natural, existing, settings and contexts,
- It is interested in meanings, perceptions and understandings,
- The research focuses more on process, not outputs,
- It uses induction for the analysis of data,
- It produces specific data rather than generalize data,
- The research findings are specific to the context.

Saunders et al. (2012) state that one way to differentiate quantitative research from qualitative research is to distinguish between numeric data (numbers) and non-

numeric data (words, images, video clips and other similar material). In this way, "quantitative" is often used as a synonym for any data collection technique (such as questionnaire) or data analysis procedure (such as graphs or statistics) that generates or uses numerical data. In contrast, "qualitative" is often used as synonym for any data collection technique (such as an interview) or data analysis procedure (such as categorizing data) that generates or uses non-numerical data [23].

Saunders et al. (2012) reinterpret quantitative and qualitative methodologies through their associations to philosophical assumptions and also to research approaches and strategies. Quantitative research is associated with positivism, realist and pragmatist philosophies, especially when used with predetermined and highly structured data collection techniques. Qualitative research is associated with an interpretive philosophy, because researchers need to make sense of subjective and socially constructed meanings expressed about phenomenon being studied. Quantitative research is usually associated with deductive approach, where the focus is on using data test theory [23]. Many varieties of qualitative research commence with an inductive approach, where a naturalistic and emergent research design is used to develop a richer theoretical perspective than already exists in the literature. Quantitative research examines relationships between variables, which are measured numerically and analyzed using a range of statistical techniques. Qualitative research studies participant's meanings and relationships between them, using a variety of data collection techniques and analytical procedures, to develop a conceptual framework. Quantitative research is associated with experimental and survey research strategies. In quantitative research, a survey research strategy is normally conducted through the use of questionnaires or structured interviews and structured observations. Qualitative research is associated with a variety of strategies: action research, case study research, ethnography, grounded theory and narrative research.

According to Bryman and Bell (2015), many scientists see quantitative and qualitative research as having different epistemological foundations. Authors outline the differences between quantitative and qualitative research in terms of three areas: principal orientation to the role of theory in relation to research, epistemological orientation and ontological orientation [24].

Bryman and Bell (2015) state that quantitative research is a research strategy that emphasizes quantification in the collection and analysis of data and entails a deductive approach to the relationship between theory and research; qualitative research is a research strategy that emphasizes words rather than quantification in the collection and analysis of data and emphasizes an inductive approach to the relationship between theory and research. Quantitative research has incorporated the practices and norms of the natural scientific model and of particular positivism, taking a view of social reality as an external objective reality. Qualitative research has rejected the practices and norms of the natural scientific model and of positivism on the ways in which individuals interpret their social word and takes a view of social reality as a constantly shifting emergent property of individuals' creation [24].

According to Bryman and Bell (2015) the main steps in quantitative research are: (1) elaborate theory; (2) devise hypothesis; (3) select research design; (4) devise measures of concepts; (5) select research site(s); (6) select research subjects/respondents;

(7) administer research instruments/collect data; (8) process data; (9) analyze data; (10) develop findings/conclusions; (11) write up findings/conclusions [24].

According to Bryman and Bell (2015) the main steps in qualitative research are: (1) general research questions; (2) selecting relevant site(s) and subjects; (3) collection of relevant data; (4) interpretation of data; (5) conceptual and theoretical work [(a) tighter specification of the research question(s); (b) collection of further data]; (6) writing up findings/conclusions [24].

Scientists have explored the contrasts between quantitative and qualitative research [24]:

- *numbers versus words*: quantitative researches applying measurement procedures to social life while qualitative researchers are seen as using words in presentation of analyses of society;
- *point of view of researcher versus points of view of participants*: in quantitative research, the investigator is in the main place (the set of concerns that he or she brings to an investigation structures the investigation), in the qualitative research the perspective of those being studied (what they see as significant) provides the point of orientation;
- *researcher is distant versus researcher is close*: in quantitative research researchers are not involved with their subjects (for example, postal questionnaires, hired interviewers) and may have no contact with them at all; the qualitative researcher seeks to close involvement with people being investigated, so that they could understand the world through their eyes;
- *theory and concepts tested in research versus theory and concepts emergent from data*: in quantitative research theoretical work precedes the collection of data; in qualitative research concepts and theoretical elaboration emerge out of data collection;
- *static versus process*: quantitative research is frequently depicted as presenting static image of social reality with its emphasis on relationships between variables; qualitative research is often depicted as attuned to the unfolding of events over time and to the interconnections between the actions of participants of social settings;
- *structured versus unstructured*: quantitative research is typically highly structured; in qualitative research the approach is invariably unstructured, so that the possibility of getting at actors' meanings and of concepts emerging out of data collection is enhanced;
- *generalization versus contextual understanding*: quantitative researchers want their findings to be generalizable to the relevant population, the qualitative researcher seeks an understanding of behaviour, values, beliefs, in context in which the research is conducted;
- *hard, reliable data versus rich, deep data*: quantitative data are often depicted as 'hard' in the sense of being robust and unambiguous, owing to the precision offered by measurement; qualitative researchers claim that their contextual approach and their often-prolonged involvement in a setting engender rich data;
- *macro versus micro*: quantitative researchers are often depicted as involved in uncovering large-scale social trends and connections between variables, whereas

qualitative researchers are seen as concerned with small-scale aspects of social reality, such as interaction;
- *behavior versus meaning*: quantitative researcher is concerned with people's behavior; qualitative researcher with the meaning of action;
- *artificial settings versus natural settings*: quantitative researchers conduct research in a contrived context; qualitative researchers investigate people in natural environments.

Scientists have explored also the similarities between quantitative and qualitative research [24]:

- Both are concerned with data reduction (by reducing the amount of data, they can than begin to make sense of it),
- Both are concerned with answering research questions (more specific in quantitative research, more open-ended in qualitative research),
- Both are concerned with relating data analysis to the scientific literature,
- Both are concerned with variation (to explore some of the factors connected to that variation),
- Both treat frequency as a platform for analysis,
- Both seek to ensure that deliberate distortion does not occur,
- Both argue for the importance of transparency,
- Both must address the question of error; research methods should be appropriate to the research questions.

If the research design combined quantitative and qualitative research, it is called a mixed method approach. Saunders et al. (2012) state that mixed methods research may use quantitative research and qualitative research equally or unequally [23]. In this way, the priority or weight given to either quantitative or qualitative research may vary, so that one methodology has a dominant role, while the other plays a supporting role, depending on the purpose of the research project. Embedded mixed methods research is the term given to the situation where one methodology supports the other. During data collection this may occur in different ways. One methodology may be embedded within the other during a single means to collect data. This is known as a concurrent embedded design.

Scientists divide various research methods such as observation, experiment, questionnaires, interview, focus group, use of case studies, etc. [23,24,4,25,26].

According to Horn (2009) mixed methods are often used sequentially, one after the other in a two-phase design. Qualitative method informs the quantitative method, often following inductive reasoning. When an area is not well researched or is lacking in well-developed theory, it may be difficult to create a questionnaire or a hypothesis [22]. A qualitative method, such as interviews or focus groups, would then be used to explore issues. The analysis of the data would allow issues and ideas for the quantitative study to explore.

Quantitative method followed by the qualitative method—the qualitative method is use to explore interesting or complex issues raised by the questionnaire study. This approach would be broadly following the deductive method. If the quantitative data

is finding confused or irregular-looking outcomes, a qualitative study (for example interviews) can be used to follow up and explore these unusual outcomes [22]. Table 1 presents research methods definitions, advantages and disadvantages of methods.

Walle (2015) underlines that when choosing a method for gathering information, a variety of issues arise including [27]:

- Cost (what is the cost; are these costs affordable; do they give a true value for the money allocated);
- Time (how much time is required, can the project be completed on schedule, what are the trade-offs of time and costs; are they acceptable);
- Beneficial characteristics (what other characteristics and considerations need to be considered);
- and other issues (what other issues have a significant impact upon the product and/or methodological issues).

2 Observation

Observation is the systematic process of recording and gathering data by watching different research objects (people behaviour, events, situations, environment, etc.). Observations can be overt (people know they are being observed) and covert (people don't know that they are being observed). The benefit of covert observation is that people behave naturally if they do not know they are being observed.

Veal (2005) divides the context of observational research into spatial use of sites, workplace behavior, consumer testing, complementary research and social behavior [21].

Spatial use of sites method (including workplaces, retail areas, public areas such as roads or urban precincts, and recreational spaces, such as parks, beaches) can be used to examine how space is used, the use level of particular areas, traffic flow and the movement of material and people. The movement of people within an area can be recorded for later analysis by using a video camera.

Workplace behavior allows a range of workplace behaviors to be examined. It is possible to observe an individual's physical actions, non-verbal behaviours (such as tone of voice or body language) and the time taken to perform tasks, as well as physical distances between people at work. Finding out about such things requires observation—sometimes-covert observation. This may raise employee relations issues and ethical issues concerning people's rights to privacy.

Consumer testing is another under-exploited use of observation, sometimes referred to as "mystery shopping". While interviews are the most common means to obtain information on the quality of the experience offered by, for example, shopping centre an additional mean is for researcher to play the role of an incognito customer and analyse information availability and clarity, product availability, staff courtesy and/or knowledge.

Table 1 Research methods advantages and disadvantages

Method	Definition	Advantages	Disadvantages
Observation	The systematic process of recording and gathering data by watching different research object (people behaviour, events, situations, environment, etc.)	Access to situations and people where other research methods are difficult to use; access to people in real life; proper method for explaining environmental context information	Difficulty of waiting for long periods to capture the relevant phenomena; the expense of observer costs and equipment; the problems of quantification and disproportionately large records; time consuming
Experiment	A research investigation in which the researcher has complete control over one set of the variable and manipulates the others	The ability to uncover causal relationships; provisions for controlling extraneous and environmental variables; convenience and low cost of creating test situations rather than searching for their appearance in business situations; the ability to replicate findings and thus rule out idiosyncratic or isolated results; the ability to exploit naturally occurring events	It is difficult to design experiments to present a specified population; it is difficult to choose the 'control' variables to exclude all confounding variables; the experiment is an unnatural social situation with a differentiation of roles; experiments cannot capture the diversity of goals, objectives and service inputs, which may contribute to outcomes in natural settings
Questionnaires	Include all methods of data collection in which each person is asked to respond to the same set of questions in a predetermined order	Can collected large amounts of information from a large number of people in a short period of time; the results of the questionnaires can be quickly and easily quantified; can be analysed more objectively than other research methods; economical and anonymity aspects	Lack of personal contact (the researcher is not able to establish a personal relationship with the respondents); level of understanding (respondents may read differently into each question and reply based on their own interpretation of the question); time consuming
Interview	A purposeful conversation between two or more people, requiring the interviewer to establish rapport to ask concise and unambiguous questions to which the interviewee is willing to respond, and to listen attentively	Development of relationship; selection of suitable candidate; collection of primary and sufficient information; time saving; increasing knowledge	Record problems; lack of attention; time consuming; personal aspects (personal matters may not be revealed by the interview method)

(continued)

Table 1 (continued)

Method	Definition	Advantages	Disadvantages
Focus group	A group interview that focuses upon a particular issue, product, service or topic by encouraging discussion amongst participants and the sharing of perceptions in an open and tolerant environment	Interaction and deepness; intelligibility; non-verbal aspect; time saving; variety points of view	The researcher has less control over proceedings than with the individual interview; the data is difficult to analyse; it is difficult to organize; the recordings are more difficult to transcribe than equivalent recordings of individual interviews; there are possible problems of group effects
Case studies	Investigates a contemporary phenomenon (the "case") in its real-world context, especially when the boundaries between phenomenon and context may not be evident	Case study is based on people's competencies, own experiences and practices and it is main factor for learning process; case studies allow to present the complexity of social life; is possible to collect detailed information	The complexity of a case study can make analysis more difficult; case studies provide little basis for scientific generalisation; case studies are difficult to conduct and it are difficult to manage and organise data systematically

Complementary research can be a necessary to interview surveys in order to compensate for variation in sampling rates (for example, off peak periods and users and peak periods and users).

Social behavior observation has been used in sociological research to develop ideas and theories about social behavior. Researchers use an interactive and inductive process to build explanations of social behavior from what they observe.

Saunders et al. (2012) divide two types of observation: participant observation and structured observation [23].

Participant observation is when the researcher attempts to participate fully in the lives and activities of members and thus becomes a member of their group, organisation or community. This enables the researcher to share their experiences by merely observing what is happening and feeling it.

There are four types of participant observation [3, 23]:

- complete participant: role sees you as the researcher attempting to become a member of the group in which you are performing research, who operates covertly, concealing any intention to observe the setting;
- participant-as-observer: the researcher would both take part and reveal the purpose as a researcher; participant-as-observer forms relationships and participates in activities but makes no secret of an intention to observe events;

– observer-as-participant: an identity as a researcher would be clear to all concerned and they would know the purpose of research; observer-as-participant maintains superficial contacts with the people being studied;
– complete observer: researcher wouldn't take part in the activities of the group, merely stands back and eavesdrops on the proceedings.

Structured observation has a high level of predetermined structure. May form only a part of your data collection approach because its function is to tell how often things happen rather than why they happen. Structured observation is concerned with the frequency of events. It is characterised by a high level of predetermined structure and quantitative analysis [23, 28].

Veal (2005) presents the main steps in an observation research method: (1) choice of site; (2) choice of observation point(s); (3) choice of study time period(s); (4) continuous observation or sampling; (5) determine count frequency; (6) decide what to observe; (7) division of site into zones; (8) design of recording sheet; (9) conduct study; (10) analyse data [21].

Cooper and Schindler (2011) underline the importance of data collection plan, which specifies the details of the task and answers the questions *who*, *what*, *when*, *how* and *where* [4].

Who consist in aspects such as:

– What qualifies a participant to be observed;
– Each participant must meet a given criterion.

Those who initiate a specific action:

– Who are the contacts to gain entry, the intermediary to help with introductions, the contacts to reach if conditions change or trouble develops;
– Who has responsibility for the various aspects of the study;
– Who fulfills the ethical responsibilities to the participants.

What consist in the characteristics of the observation that must be set as sampling elements and units of analysis. This is achieved when event-time dimension and "act" terms are defined. In the event sampling, the researcher records selected behavior that answers the investigative questions. In time sampling, the researcher must choose among a time-point sample, continuous real-time measurement, or time-interval sample. Other important dimensions are defined by acts: a single expressed thought, a physical movement, a facial expression, a motor skill.

When, is the time of the study important, or can any time be used.

How, consist in aspects such as:

– Will the data be directly observed;
– How will the results be recorded for later analysis;
– How will the observers deal with various situations that may occur.

Where, is related with place aspects.

Scholars presented a variety of examples on how to prepare observation form, which included information about observation object, place, date, topic, setting, observation results, etc. (Table 2).

Table 2 Example of observation form

Study Subject Evaluation Form

Lecturer:_____ Observer:_____

Location:_____ Date and time:_____

Title of study subject:_____ Students group:_____

Scale of evaluation from 1 to 5, where 1 – unsatisfactory, 2 – fair, 3 – satisfactory, 4 – very good, 5 – excellent.

Evaluation criterion	Rating (circle)	Comments (if any)
Study subject content		
Shows good knowledge of study subject	1 2 3 4 5	
Presented study subject systematically	1 2 3 4 5	
Teaching methods		
Uses active teaching methods	1 2 3 4 5	
Uses case study method	1 2 3 4 5	
Uses group discussions	1 2 3 4 5	
Management skills		
Time management	1 2 3 4 5	
Auditorium control	1 2 3 4 5	

Stokes and Wall (2014) present main dimensions of the research field in relation to which data can be gathered [3]:

- Space—the researcher has to describe physical place in which operating (what does it look like, feel like);
- Actors—who is the researcher observing, which is his personality and profile, what relationships exist between actors;
- Activities—what is taking place in the setting, who is doing what with whom;
- Objects—what objects are present in the research setting and what role do they play in relation to the actors;
- motivation and goals—what are the actors moving towards, what is motivating them;
- feelings—how do actors behave, what are their emotions.

The strengths of observation as a data collection method include: access to situations and people where other research methods (as questionnaires or interviews) are difficult to use, access to people in real life and proper method for explaining environmental context information.

Observation may be limited by the difficulty of waiting for long periods to capture the relevant phenomena, the expense of observer costs and equipment, the problems of quantification and disproportionately large records and time consuming.

3 Experiment

There are variety of ways to test and do research on new ideas, products, services or theories. One of these ways is by experimentation. This is when the researcher has complete control over one set of the variable and manipulates the others.

According to Pickard (2013) experiment is a controlled research situation, which means that unwanted variables and external influences can be kept out of the experimental environment and the researcher can establish the experimental conditions down to the smallest details [5]. When these conditions are not entirely met, then the researcher has a responsibility to identify the extent of the error. Experimental error occurs when a change in the dependent variable is produced by any variable other than the independent variable.

Scientists divide different types of variables: the independent variable, the dependent variable, the moderator variable, the control variable [5].

The independent variable is the phenomenon or situation that is manipulated by the researcher.

The dependent variable is the behaviour or effect that is measured by the researcher as a result of manipulation.

The moderator variable is a factor, which is measure, manipulate or select by the researcher to determine whether it changes the relationship between the independent variable and the dependent variable or not.

Consideration of the following activities is essential for the execution of a well-planned experiment:

- Select relevant variables for testing,
- Specify the treatment levels,
- Control the environmental and extraneous factors,
- Choose an experimental design suited to the hypothesis,
- Select and assign subjects to groups,
- Pilot test, revise, and conduct the final test,
- Analyze the data (Cooper, Schindler 2011).

Blaxter et al. [25] and Cooper and Schindler [4] distinguish such kind of advantages of experiment through:

- The random assignment of people to intervention and control groups the risk of extraneous variables confounding the results is minimized,
- Control over the introduction and variation of the 'predictor' variables clarifies the direction of cause and effect,
- The experiment is the only research design which can, in principle, yield causal relationships.

According to Cooper and Schindler (2011) an evaluation of the experiment method reveals several advantages:

- The ability to uncover causal relationships,
- Provisions for controlling extraneous and environmental variables,

– Convenience and low cost of creating test situations rather than searching for their appearance in business situations,
– The ability to replicate findings and thus rule out idiosyncratic or isolated results,
– The ability to exploit naturally occurring events [4].

The main disadvantages of experiment are [25]:

– It is difficult to design experiments s to present a specified population,
– It is difficult to choose the 'control' variables to exclude all confounding variables,
– The experiment is an unnatural social situation with a differentiation of roles,
– Experiments cannot capture the diversity of goals, objectives and service inputs which may contribute to outcomes in natural settings, etc.

4 Questionnaires

A questionnaire consists of a set of questions presented to respondents for them answers.

Saunders et al. (2012) describe a questionnaire as a general term to include all methods of data collection in which each person is asked to respond to the same set of questions in a predetermined order [23].

In preparing questionnaires, business researcher decides what kind of questions to ask, the form of questions, the content of questions, the wording and ordering of questions, etc.

Business researchers distinguish between closed questions (questions that allow respondents to choose the answer; for example, the question is "are you satisfied with study quality" and the possible answers are "yes"; "no") and open questions (questions that allow respondent to answer based own words; for example, "what is your opinion of the study quality").

Scientists present different types of closed and open questions. Closed questions can be divided to [5, 29] (Fig. 1):

– dichotomous: a question offering to choose from two possible responses;
– multiple choice: a question offering three or more answer choices;
– Likert scale: a bipolar scaling technique, which allows a respondent to select choice that best demonstrates their level of agreement with a given statement;
– semantic differential: a multidimensional measure between two bipolar adjectives;
– importance scale: a scale that rates the importance of some attribute from 'not at all important' to 'extremely important';
– rating scale: a scale that rates some attribute from 'poor' to 'excellent';
– intention-to-buy scale: a scale that describes the respondent's intentions to buy.

According to Saunders et al. (2012), the questionnaires can be divided also in two main groups as self-completed and interviewer-completed [23].

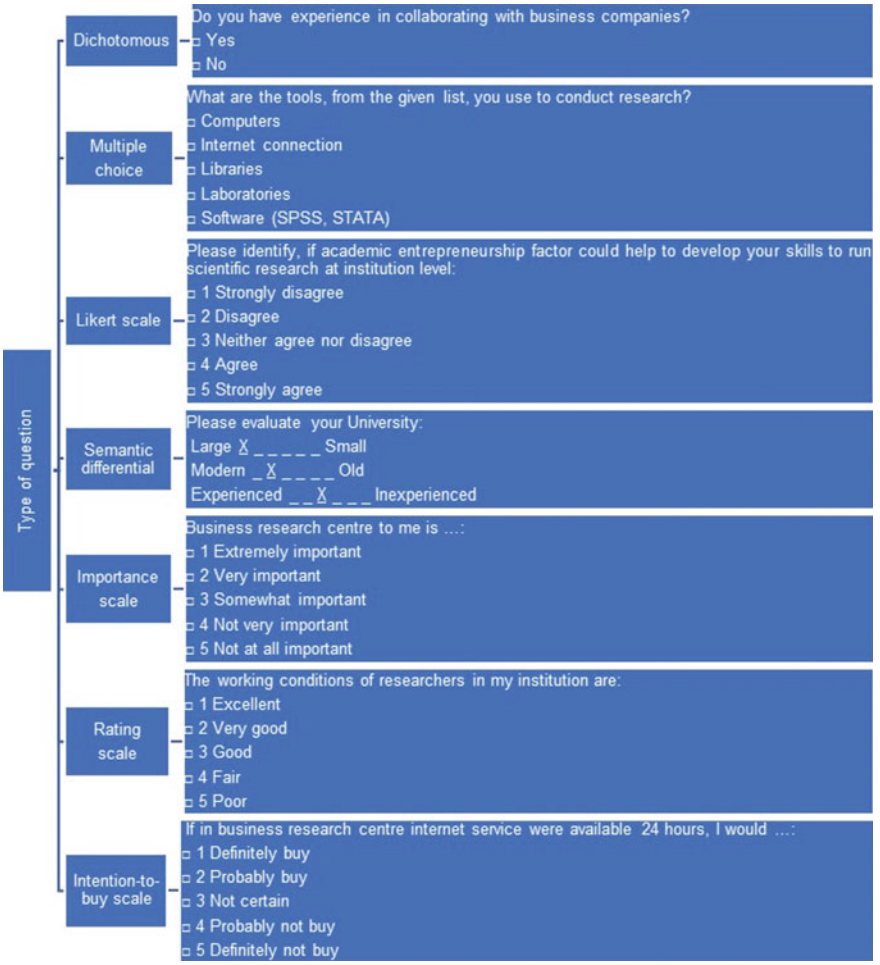

Fig. 1 Types of closed-end questions and examples

Self-completed questionnaires are usually completed by the respondents. Such questionnaires are sent electronically using the internet (internet-mediated or web-based questionnaires) or intranet (intranet-mediated questionnaires), posted to respondents who return them by post after completion (postal or mail questionnaires), or delivered by hand to each respondent and collected later (delivery and collection questionnaires).

Open-end questions can be divided to [5, 29] (Fig. 2):

– completely unstructured: a question in which respondents can answer in unlimited number of ways;
– word association: words are presented one at a time, and respondents mention the first word that comes to mind;

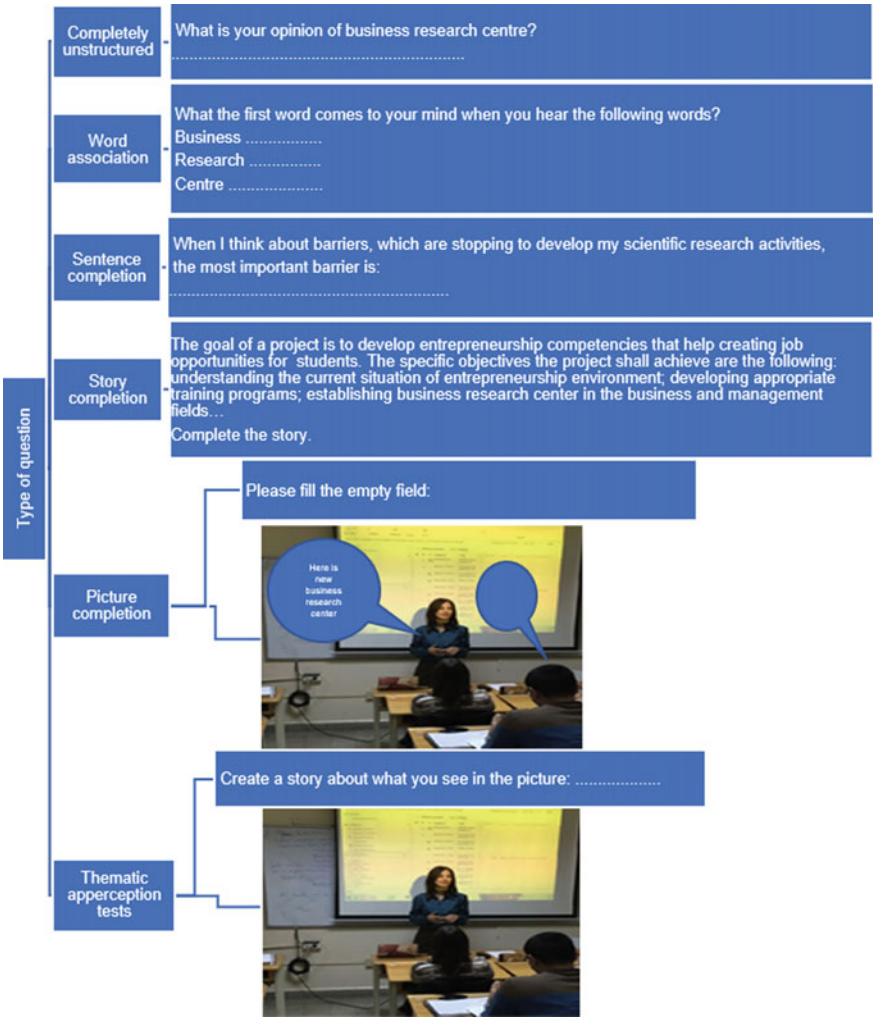

Fig. 2 Types of open-end questions

- sentence completion: incomplete sentences are presented one at a time and respondents complete the sentence;
- story completion: an incomplete story is presented and respondents are asked to finish it;
- picture completion: a picture of two characters is presented, with one making a statement and respondents are asked to identify with the other and fill the empty balloon;
- thematic apperception tests: a picture is presented and respondents are asked to create a story about what they think is happening or may happen in the picture.

Pickard (2013) presents the main steps in designing a questionnaire:

- Review data requirements of the research question,
- Develop a list of potential research questions to provide required information,
- Prioritize list of questions,
- Evaluate each potential research questions using such criteria as understanding of participants, position to answer, preparation of participants, content of questions,
- Determine the questions form (open, close, scale),
- Construct specific wording of each question,
- Prepare the structure of the questionnaire,
- Evaluate and pilot the questionnaire,
- Make necessary changes and distribute [5].

Horn (2009) underlines the importance of questions order [22]:

- From general to particular,
- From easy to difficult,
- From factual to abstract,
- Start with closed-format questions,
- Start with questions relevant to the main subject,
- Demographic and personal questions place at the end.

Many scientists state that the questionnaire must be piloted with a potential group of respondents. For example, 6–10 people for clarifying each question, for understanding the clarity and rightness of each question, the sensibility of question, the questionnaire format, the language style, etc.

The main advantages of questionnaires are:

- Collected large amounts of information from a large number of people in a short period of time,
- The results of the questionnaires can be quickly and easily quantified by using of a software package,
- Can be analysed more objectively than other methods of research,
- Economical aspects (it is economical both for the researcher and for the respondent in time, effort and cost),
- Anonymity issues (this method ensures anonymity to respondents, they feel more comfortable and free to express their point of view in questionnaire).

The main disadvantages of questionnaires are:

- Lack of personal contact (the researcher is not able to establish a personal relationship with the respondents and there is difficult to understand how truthful the respondents are being),
- Level of understanding (respondents may read differently into each question and therefore reply based on their own interpretation of the question),
- Time consuming (open-ended questions can generate large amounts of data and that can take a long time to analyse data, etc.).

5 Interview

The interview is a purposeful conversation between two or more people, requiring the interviewer to establish rapport, to ask concise and unambiguous questions to which the interviewee is willing to respond and to listen attentively [23].

Interviews are led by interviewers and the people being interviewed are called interviewees. Interviews can consist from open and closed questions. Closed questions are questions phrased in order to get 'yes' or 'no' answers (for example, which tool for conducting research would you use; computer, internet connection, library, laboratory, software or none of these?).

According Veal (2005) the interview can be used [21]:

- When the subjects of the research are relatively few in number, so a questionnaire-based in quantitative research style is inappropriate,
- When the information to be obtained from each subject is expected to vary considerably and in complex ways. Each interview would be a 'story' in its own right,
- When a topic is to be explored as a preliminary stage of a larger study, possibly a quantitative study such as a questionnaire-based survey.

Scientist divide two groups of interview: individual depth interview and group interviews. Interviews can be conducted in a number of modes: face-to-face, via telephone, via internet, etc.

Individual depth interview is an interaction between an individual interviewer and a single interviewee. Individual depth interviews generally take between 20 min and 2 h to complete, depending on the issues or topics of interest and the contact method used [4].

A group interview is a data collection method using a single interviewer with more than one participant. Group interviews vary widely in size: dyads (two people), triads (three people), mini-groups (two to six people), small groups (six to ten people) or super-groups (up to 20 people) [4].

According Horn (2009) group interviews should be used for specific research purposes:

- To investigate the dynamics of a group,
- To explore the reality of group membership,
- To debate group issues as a collective,
- To discover the methods and dynamics of group cohesion,
- To explore shared meanings,
- To investigate the roles played by group members,
- To discover the processes of constructing realities in groups [22].

Individual depth interview is divided in [4]:

- oral history: ask participants to relate their personal experiences and feelings related to historical events or past behaviour;

– cultural interviews: ask a participant to relate his or her experiences with a culture or subculture, including knowledge passed on by prior generations and the knowledge participants have or plan to pass on to future generations;
– life histories: extract from a single participant memories and experiences from childhood to the present day regarding a product or service category, brand, or firm;
– critical incident technique: the participant describes what led up to the incident; exactly what he or she did or did not do that was especially effective or ineffective;
– convergent interviewing: experts serve as participants in a sequential series of individual depth interview;
– sequential interviewing: approach the participant with questions formed around an anticipated series of activities that did or might have happened, in order to have the participant recall the detail of his or her own experience;
– ethnography: interviewer and participant collaborate in a field-setting participant observation and unstructured interview;
– grounded theory: using a structured interview, each subsequent interview is adjusted based on the findings and interpretations from each previous interview, with the purpose to develop general concepts or theories with which to analyse the data.

Interviews can be differentiated according to the level of structure and standardisation adopted.

Scientists suggesting interviews are categorised in structured interviews, semi-structured interviews, and unstructured interviews [3, 23].

In a structured interview, the questions to be asked are written out clearly and the interviewer asks the interviewee the questions based on standardised set of questions.

A semi-structured interview is a combination of structured and unstructured interviews. The researcher will have a list of topics and fixed questions to be covered. Some of them may be closed questions interspersed with more open-style questions. The order of questions may also be flexible depending on the conversation.

An unstructured interview is the opposite of a structured interview. Here the interviewer asks a number of questions that are related to the topic in an informal way. This means that there is no predetermined list of questions, although the researcher has to have a clear idea about the aspects that wants to analyse.

Many scientists present main interview process steps. They are the following:

– The creation of comfort,
– The purpose of the interview,
– A address terms of confidentiality,
– Format of the interview,
– Duration of interview,
– Record of interview,
– Questions,
– Feedback of interview results.

By the creation of comfort is suggest to avoid loud lights or noises, to ensure that the interviewee is comfortable (you might ask them if they are). Often, they may feel more comfortable at their own places (home or work).

Purpose of interview tries to explain the purpose of the interview.

Address terms of confidentiality note any terms of confidentiality, explain who will get access to their answers and how their answers will be analysed and if the interviewee comments are to be used as quotes. If so, the interviewer must get a written permission from the interviewee to do so.

The format of interview explains the format of the interview and explain the type of interview that the interviewer is conducting.

The duration of interview indicates how long the interview usually takes.

For the record of the interview the interviewer doesn't have to recall all the answers. He must ask for permission to record the interview or bring along someone to take notes.

By the questions the interviewers must ask the interviewee if they have questions before the interview get started.

Feedback of the interview results must give the interviewee the opportunity gets in touch with the interviewer after it, if he or she wants to receive feedback of research results.

Pickard (2013) presents main stages of the interview process [5]:

- Thematising (here is important to identify the problematic points, topics and the purpose of research),
- Designing (here is important to choose the type of interview),
- Interviewing (the main issue in this step to make the interviewee feel comfortable),
- Types of interview (structured interviews, semi-structured interviews, and unstructured interviews),
- Recording (important to choose the most appropriate technique for recording interview),
- Transcribing and analysing;
- Verifying and reporting.

Scientists list some advantages of interview:

- Development of relationship (it increases mutual understanding and co-operation between the parties),
- Selection of suitable candidate,
- Collection of primary and sufficient information (the interviewer can ask proper question to the interviewee),
- Time saving (within a very short time communication can be accomplished with the interview),
- Increasing knowledge.

The main disadvantages of interview are the following:

- Record problems (if interviewee doesn't agree to record interview and no evidence actually that have been discussed at interview),

– Lack of attention from both sides (sometimes it is observed that both, the interviewer and the interviewee, are less attentive, that is why real information cannot be collected),
– Time consuming (preparation for the interview, taking interview and interpretation of the research results required much time),
– Personal aspects (personal matters may not be revealed by interview method).

6 Focus Group

A focus group is a group interview that focuses upon a particular issue, product, service or topic by encouraging discussion amongst participants and the sharing of perceptions in an open and tolerant environment. Participants are selected because they have certain characteristics in common that relate to the topic being discussed and they are encouraged to discuss and share their points of view without any pressure to reach a consensus [23].

The main purpose of focus groups is to test new ideas, to evaluate products (or services). It is also use for external customers for giving feedback on consumer products (or services).

According to Carkenord (2009) focus groups are led by professional, independent facilitators who are skilled at observation, listening, feedback. The facilitator does not participate in the group discussion and does not attempt to influence any opinions [30]. These sessions are often held in a special place, convenient for participants.

The focus group usually comprises between 5 and 12 participants. Participants of focus group are encouraged to feel comfortable and invited to talk freely, but with the moderator supervision and control. The objective is to look for consistencies in, for example, behaviour, and perceptions or purchase intent. The usual procedure is to tape record the discussion and for the researcher to produce a summary from the recording.

According to Pickard (2013) the process of focus group should follow the following steps:

– Identification of participants,
– Selection place,
– Preparation of invitation letters for participants (including research purpose, discussion topics, date, time, duration, place, ethical issues, etc.),
– Preparation of venue (important that participants would see and hear each other),
– Selection of equipment (tape recorder, paper and etc.),
– Briefing sheet and introduction,
– Preparation for moderating process,
– Expression of gratitude to participants [5].

Scientists present some advantages of focus group:

– Interaction and deepness (the researcher can interact with the participants, ask follow-up questions or questions that probe more deeply),

– Intelligibility (results can be easier to understand),
– Non-verbal aspect (the researcher can get information from non-verbal responses, such as facial expressions or body language),
– Time saving (information is provided more quickly than if people were interviewed separately),
– Variety points of view.

For Bryman and Bell (2015) focus groups' disadvantages are [24]:

– The researcher has less control over proceedings than with the individual interview,
– The data is difficult to analyse,
– Data is difficult to organize,
– The recordings are more time-consuming to transcribe than equivalent recordings of individual interviews,
– There are possible problems of group effects.

Carkenord (2009) underlines facilitated session's technique—structured, planned, working sessions for project initiation activities, where participants are carefully chosen and have a critical role to play. A facilitator is the main person who plans, design, help, control, etc. Bringing together project participants at the beginning of the project creates team synergy and motivation, because everyone feels part of the planning process and decision-making team. These sessions can also be structured as brainstorming sessions, where participants generate ideas for improving processes or creating new products (services) [30]. Facilitation team properly plans a session: topics on agenda, participants, meeting place and time, duration of session, etc. Facilitated sessions is a proper technique for brainstorming, balancing priorities and scope of project. In addition, it is use for process improvement identification, for changing experiences and for team building.

7 Case Study

A case study investigates a contemporary phenomenon (the "case") in its real-world context, especially when the boundaries between phenomenon and context may not be evident. The second part of the definition points to case study are design and data collection features, such as how data triangulation helps to address the distinctive technical condition whereby a case study will have more variables of interest than data points. Among the variations in case studies, it can include single or multiple cases, it can be limited to quantitative evidence and it can be a useful method for doing an evaluation [26].

The purpose of case study is to identify solutions to situations and problems identified in the case study. Within a case study a variety of methods can be used for gather data required for research (such as interview, questionnaire) It can also be the combination of qualitative and quantitative data [3].

Bryman and Bell (2015) state that a case can be:

Table 3 Example case study: sample case study fieldwork schedule, adapted by Pickard [5]

Phase	Steps	Time (months)
1. Maintain researcher's diary throughout all phases	– Make initial contact – Obtain consent via sign-off forms – Interview to identify salient issues – Observe the participant using electronic information sources – Begin iterative analysis – Identify subsequent participants using snowball sampling	3
2. Focused exploration	– Use research methods as interviews with experts, observation, non-human sources, content analysis of documentation, iterative analysis	8
3. Compile preliminary case studies	– Check members: case study is subject to scrutiny by participants individually and during workshops	2–3

– A single organization,
– A single location, such as a factory, production site, or office building (for example: research in milk factory),
– A person,
– A single event [24].

Scientists presenting five types of case study: the critical case, the unique case, the revelatory case, the representative case and the longitudinal case [24].

The critical case is where the researcher has a clearly specified hypothesis and a case is chosen on the grounds that will allow a better understanding of the circumstances in which the hypothesis will and will not hold.

The unique case—it is the unique or extreme case.

The revelatory case is where the basis for this case exists when an investigator has an opportunity to observe and analyze a phenomenon previously inaccessible to scientific investigation.

The representative or typical case seeks to explore a case that exemplifies an everyday situation or form of organization.

The longitudinal case is concerned with how a situation changes over time.

Pickard (2013) analyzes case study phases and suggests 3 phases (Table 3) [5]:

– orientation and overview (begin with research question; single or multiple case designs; selecting the site; decide on the unit of analysis; purposive sampling; setting up a case database; determining data collection techniques);

– focused exploration (data collection; iterative analysis);
– member checking (exiting the field; cross-case analysis for multiple case designs; writing up the case study).

Stokes and Wall (2014) present such case study stages as an introduction or background history that leads up to the contemporary period or moment, to the current situation and the focal issues or to problems that are to be considered, as well as analysis of the issues and proposed solutions [3].

Blaxter et al. (2010) distinguish the following advantages on case study [25]:

– Case study is based on people's competencies (knowledge, capacities and skills), own experiences and practices and it is main factor for learning process,
– Case studies allow to present systematically point of view on and the complexity of social life,
– Using case study is possible to collect detailed information, etc.

The main disadvantages of case study are:

– The complexity of a case study can make analysis more difficult,
– Case studies provide little basis for scientific generalisation and it is complicated to reach a generalising conclusion, because analysing single case,
– Case studies difficult to conduct and producing a lot of documentation and sometimes it is difficult to manage and organise data systematically.

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Research Topic Identification

Tariq Mahmoud, Viktor Dmitriyev and Oana Madalina Driha

1 Introduction

It is a very challenging task to identify topics of interests for anyone in academia. However, this process is especially challenging and unclear for the ones who are just making their very first steps in academia. The group of researchers usually includes last year master students, doctoral (graduate) students at the beginning of their "way to success" and sometimes junior researchers (post-docs, junior professors) who are about to start their own independent research group and looking for funding and ideas, which may be requesting public/private funds or just have a correlation with.

2 Research Topic Identification Approach

A very important issue to be mentioned before listing the state of the art in this domain is to know how to conduct a proper literature review process. The very first phase of managing any research is to have a proper process in listing most of the related research papers and contributions in the application domain, which is the literature review.

The most remarkable approach to have a proper literature review is proposed by Webster and Watson (2002) in their paper "Analyzing the Past to Prepare for the Future: Writing a Literature Review" [1]. These two remarkable authors explained their approach of performing a systematic literature review by reviewing firstly the

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most important publications in the leading journals in the field. This can be done with the help of one of journal databases like ABI/Inform (ProQuest) where you can find a suitable journal and review its table of content to accelerate the process of identifying relevant articles. This is besides checking high reputed conference proceedings in the research domain. After that, the researcher has to get a backword review by examining the citations in the identified articles. It is also important to make a forward review after that by using one of the citation indexing tools like Google Scholar,[1] Web of Science,[2] Scopus,[3] Mendeley,[4] etc. by which the researcher can identify further related articles that cite the already identified articles in the backword review. Following this approach must be very close "to accumulate a relatively complete census of relevant literature" [1].

The next important and complex step is reconstructing the huge amount of reviewed contributions in the related research domain. A very practical approach to accomplish this process is proposed by vom Brocke et al. (2009) in their paper: "Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process" [2]. One of the authors of this chapter, Tariq Mahmoud (2013), followed this approach in his dissertation [3]. After he collected all the relevant research articles, he eliminated the amount of articles to select the top 20% of the ranked publications in the information systems research domain since it was the considered application domain.

In this way, we can conclude that following the two approaches, from Webster and Watson [1] and Brocke et al. [2], will make the literature review process simpler and more professional.

2.1 What Research Is All About?

At the end of the day someone can claim that a research process is all about publishing your results, there is even a famous cliché like "publish or perish" [4–7]. Research is meant to solve real world problems as well as trying to mimic the imagination of the researchers. All the needs for research are firstly and most probably emerging from the environment from which the researcher starts his/her research. This latter then has to concretize these needs and transform it into the form of requirements for the research to be conducted. Depending on the discipline, the form of research is shaped. This form can be experimental, theoretical, etc., based on the followed research methodology in design or behavioral sciences besides the detailed requirements wrote by the researcher.

[1] https://scholar.google.com/

[2] http://www.webofscience.com/

[3] https://www.scopus.com/

[4] https://www.mendeley.com/

2.2 *Variety of Available Research Methodologies*

Based on the domain research assigned himself/herself there can be a different popular or not that popular research methodology. For instance, in order to conduct research on very good levels in a domain such as Information Systems Research it is worthy to follow the guidelines proposed by Hevner et al. [8] or the design science research methodology (DSRM) proposed by Peffers et al. [9].

If the researcher wants to follow a standardized research method, the best method to follow is then the information systems research framework proposed by Hevner et al. [8]. The approach behind is widely considered as one of the main reference sources in the whole information systems research due to its high quality, guidelines and criteria it presents. The conceptual framework of the proposed approach is depicted in Fig. 1.

The environment in this figure represents the problem domain that the researcher is willing to target Simon (1996) and where the research interest resides [10]. As can be seen in the figure, the environment has inside it people, organizations, technology as well as respective responsibilities [11]. The business needs could be derived from the environment's problems, goals, tasks, and motivations that are related to the organization's people. Such relation could be normally supported by the people's roles, capabilities, and characteristics. The running business processes within an organization together with its strategies, structure, and culture could assess the business

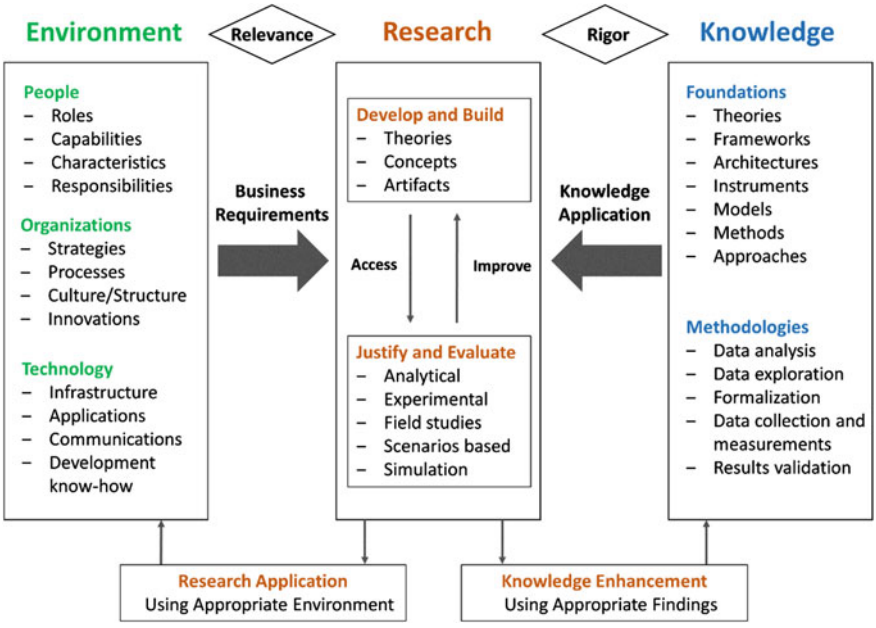

Fig. 1 Based on information systems research framework, Hevner et al. (2004), pp. 79–80 [8]

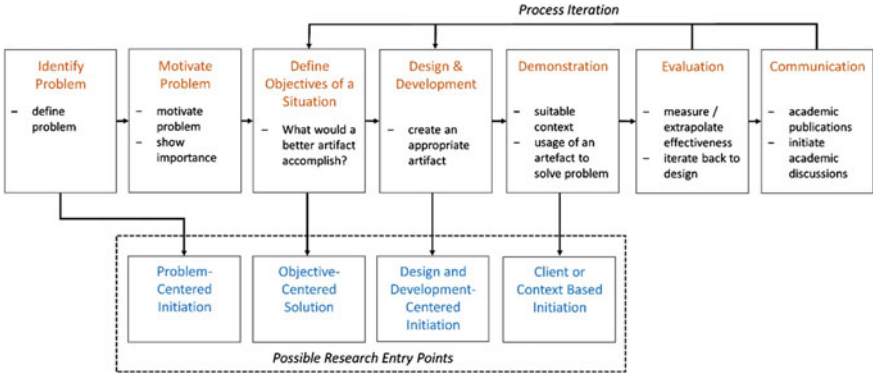

Fig. 2 Based on DSRM process model, Peffers et al. (2007), p. 54 [9]

needs. Relying on this, the technology infrastructure, applications, communication architectures, or development capabilities have to be determined in order to define the business needs. In other words, the three main components of the environment section from the figure below help to define the problem or business need that the researcher comprehended (cf. [8], p. 79).

Relying on the business needs, Hevner et al. (2004) argued that an Information Systems (IS) research can be conducted being part either of a behavioural or a design sciences [8]. While the behavioural research's goal is truth, the goal of the design research is utility. This is on one hand and on the one hand, behavioural research tries to develop and justify theories that illustrate the issues connected to the comprehended business needs. On the other side, the design research tries to build and evaluate the artefacts that have been developed to meet the defined business needs. As shown in the figure above, justify/evaluate activity drives the research assessment to identify the main weaknesses of the theory or artefact in order to be refined and reassessed. Therefore, they are considered to be inseparable from the research method (cf. [8], p. 80).

The right side of Fig. 1 shows the knowledge base that gives the foundations and methodologies to complete an IS research. Such foundations can be useful in the develop/build phase of an IS research to take benefit from former theories, frameworks, instruments, constructs, models, methods, and approaches. On the other hand, methodologies that might consist of data analysis techniques, formalisms, measures, and validation criteria are treated as the main guidelines resources for an IS research. To summarize, an IS research is considered rigor just when it appropriately applies the foundations and methodologies that compose the knowledge base (cf. [8], p. 80).

Peffers et al. (2007) had proposed a generic Design Science Research Methodology (DSRM) for information systems research [9]. The DSRM process model is composed of five main activities as depicted in Fig. 2.

The first activity in the DSRM process model is the problem identification and motivation. This activity identifies and well defines the main research problems in

order to be able to defend the contributions of the resulted research. On the one hand, this first activity is important since it provides the motivations to researchers and encourages the community in the targeted research domain to follow up on the contributions that will be resulted from the work. On the other hand, this activity supports the argumentation provided by the researcher while defending the research problems. The resources needed for this activity are mainly an in-depth knowledge of the main weaknesses in the targeted research domain besides the potential significance of the resulted solution (cf. [9], p. 54).

The second activity within the DSRM process model is the object definition. The main objectives that are defined in this activity are mainly derived from the problem identification and motivation activity. The resulted objectives are either classified quantitatively if the solution behind could become better than an existing ones or qualitatively if the solution behind would be able to solve problems that are not yet addressed by the other existing solutions. The resources needed in this activity are the state knowledge of the existing problems besides being familiar with the similar solutions in the targeted research domain (cf. [9], p. 55).

The design and development represents the third activity in the DSRM process model. The theory produced from the object definition activity forms the main characteristics of this activity. The main goal behind this activity is to deliver artefacts. These latter might include models, architectures, constructs, or instantiations [8]. "New properties of technical, social, and/or informational resources" could be included in the outputs of Järvinen (2007, p. 49) [12]. Despite that, the novelty merely represents a set of objects it has to be integrated in the resulted output. Thus, the main tasks accomplished in this activity will determine the expected functionalities and its architecture from the resulted solution and will eventually create the objects and artefacts to achieve them. The resources needed in this activity are the theory knowledge of transforming objectives into artefacts in the resulted solution (cf. [9], p. 55).

Demonstration is the fourth activity in the DSRM process model. This activity incorporates the needed steps to apply the resulted artefact from the design and development activity to solve one or more of the problems addressed by the researcher. Potential demonstration can vary from being experiments to case studies, proofs, simulations or being any other proper demonstration. The resources needed in this activity are the "how to knowledge" to show how the resulted artefact can address the problems in the targeted research domain (cf. [9], p. 55). Moreover and as proposed by Peffers et al. [9], the applicability of the resulted solution's ideas can be validated and proved either in a single act demonstration [13] or in a more formal evaluation of the designed artefact [8, 14–17].

The fifth activity in the DSRM process model is the evaluation. This activity includes both the observation and the measurement if the artefact from the resulted solution defends well the researched problems or not. Furthermore, it is important in this activity to conduct comparison between the objectives of the solution and the recent monitored results of applying the artefact in the demonstration phase. Based on the nature of the problem origin and the resulted artefact, the evaluation activity can follow different paths. Examples of these paths can be comparing the functionalities of the artefact with the objectives defined in the second activity, feedback by the

solution's users, or even a simulation. The evaluation activity may also contain quantifiable measurement of the system performance (for example service's availability or response time), or any other empirical evidence. As can be seen in Fig. 2 and upon completing this activity, the researcher will decide if it is needed to get back to the second and third activities to improve the functionalities of the artefact or to move on to the sixth activity in the DSRM model. The resources needed in this activity are the knowledge and awareness of the metrics and analysis techniques (cf. [9], p. 56).

Communication represents the last activity in the DSRM process model. The main purpose behind this activity is to communicate the contributions of all research phases to the scientific community in the targeted research domain. This communication activity is normally done in form of scholarly research publications. The authors in [8] mentioned that this activity is quite necessary to disseminate the resulting knowledge behind the conducted research to the target research community. The main resources needed in this activity are the disciplinary knowledge of how to write and publish rigor publications of the different research parts in suitable research publications (cf. [9], p. 56).

As shown in Fig. 2, the DSRM process model can lead into one of four possible research entry points namely: problem-centred initiation, objective-centred solution, design- and development-centred solution, or client-/context-initiated solution.

If the researcher sequentially goes through the aforementioned six activities, the resulted research entry point will be a problem-centred from research entry point's perspective. In other words, the model will exactly start from the first activity until the sixth activity in the DSRM model. This approach is normally resulted from observing a research problem or getting some ideas from the suggestions of future directions from previous researches (cf. [9], p. 56).

If the researcher decides to start the DSRM process model from the second activity, the research entry point is then an objective-centred solution. Such solution is normally triggered by either industrial or research needs that can be identified and gathered to develop the resulted artefact (cf. [9], p. 56). If the DSRM process model started from the third activity, the resulted research entry point is a design- and development-centred solution. This solution normally originates from an existing artefact that had not been formally employed in a solution to solve the problems in the targeted research domain. This artefact could also be resulted from another research domains or it might be even applied to solve the problems in those domains (cf. [9], p. 56).

The last research entry point results when the researcher starts the DSRM process model from the fourth activity. A client-/context-initiated solution may originate from having an observation on a practical solution that already in production. The researcher in this case gets back to produce more rigor solution than the existing one. This can be done after considering the weaknesses of the existing solution and making the best use of consulting experience (cf. [9], p. 56).

2.3 Why Is Proper Literature Review Necessary?

Literature review should be treated as core stone that will play its role in future success of any research. Core principles of proper literature review are research agonistic and are not depending on domain of research, which means good literature review is something that "must have" as a part of research experience. Additional argument for proper literature review is that it is a permanent a part of any existing research methodology. Shortly saying, research goals could not be achieved without properly held literature review. However, despite concepts of a literature review could be straightforward and easy to grasp, in realty, a good and high quality literature review is something that is really hard to manage. Especially, it is very crucial to properly organize and conduct literature review process on very first steps of research progress. In case of topic identification, despite for the first time it is hard to focus on particular research topics/domains, journal, conferences, workshops, books, etc. process of literature review will introduce researcher into proper terminology and provide. It is a good idea for researcher, who is not familiar with domain, to start from state-of-the-art surveys/reviews, which will providing generic overview of the domain, proper terminology and core research works and maybe ongoing research activities. Another important point, while performing literature review on very first steps, is to make a self-maintained list of unsolved problems, which are usually left by manuscripts authors as future work within a publication itself. However, there are multiple types of research problem exist—(1) problems that are stay unsolved for decades, which can be seen as core issues of particular domain; (2) problems that smaller in size, but solution of which could bring particular method of targeted research domain ahead.

3 Conclusion

The decision about particular topic of a research is one of the most strategical and life changing steps to be taken by a particular researcher. Despite such decisions are introducing a lot of uncertainty to the researcher's future, they also open a new ways and approaches to be handled and processed. Thus, it's crucial to explain, how it is challenging to identifying most suitable research topic for a particular researcher. Thus, this work demonstrates how to follow a proper research methodology in information systems in order to minimize amount of uncertainty, which is in anyway going to be a part of a research topic identification path.

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Measurement and Measurement Scales

Serene Dalati

1 Introduction

In business studies measurement is crucial and required in different situations requesting research. In behavioural management, measurement is crucial in examining employee attitudes including job satisfaction, organisational commitment, organisational trust and motivation at work. In marketing research measurement is also crucial in consumer behaviour and customer satisfaction surveys. Attitudes related to perceived service quality also applies measurement scales. In production management it is also crucial to define tools for measuring quality assurance. The purpose of this chapter is to explore the concept of measurement with a focus on business research. The nature of measurement, types of measurement levels and different types of measurement scales are under examination in this chapter. The scope of this chapter is within business research studies, therefore examples and illustration will be provided from research in business fields. The target audience is focused towards students and researchers of business studies with an orientation towards behavioural management and marketing research. It provides a reliable illustration for undergraduate students of business research.

2 Measurement Defined

Measurement in business research is extensively examined. What is measurement? Why measurement? What is being measured? What is the relation between concepts and constructs, and how are they related to the measurement of objects of study? All these are questions that this chapter aims to answer in the following sections. Examining measurement in studies is comprised of assigning numbers to empirical events, objects or phenomenon, which should be related to specific rules and measurement

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design [1]. The measurement process starts with selecting a subject of analysis or an observable event, then investigating guidelines which include assigning numbers or codes to indicate certain features about subject of analysis. The mapping rules should be applied to each observed phenomenon.

3 Types of Variables and Data

It is argued that concepts and constructs are used at a theoretical level, whereas variables are applied at an empirical level [2]. The study of measurement will, by definition, lead to the exploration of variables and types of data. A variable is a characteristic or attribute that can assume different values. Data, on the other hand are the values that the variable can assume [3]. Variables can be classified as qualitative or quantitative. Whereas qualitative variables can be indicated as distinct according to some characteristic or attribute, quantitative data are numerical and can be numbered. For example, gender is considered as qualitative variable, where the subject of analysis is classified as either male or female. This is an example of categorical data. Quantitative variables can be classified into two categories: discrete and continuous. Discrete variables can assume values that can be counted. For instance, the number of phone calls a customer service representative answers each day is an example of discrete variable; the number of students in a classroom is also another example of discrete variable. Contentious variables, by comparison, can assume an infinite number of values between any two specific values. They include fractions and decimals. For example, age, income, height and weight are quantitative variables.

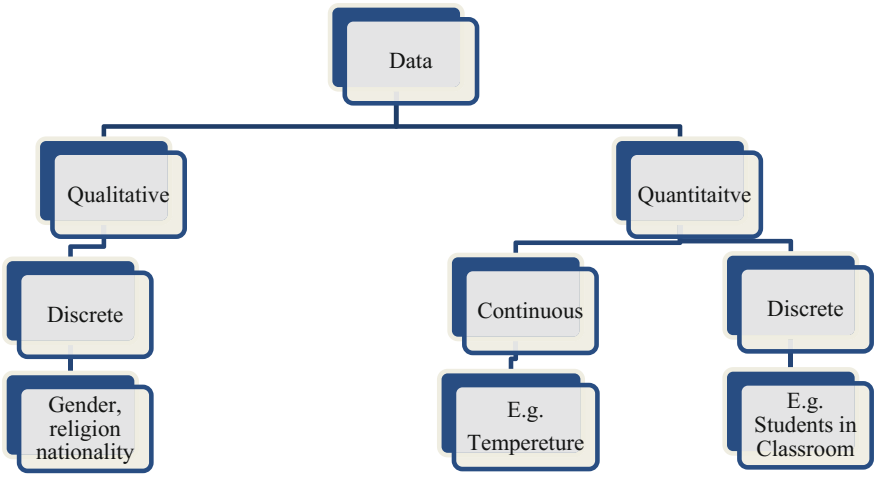

Fig. 1 Difference between quantitative and qualitative data

In Fig. 1, the mentioned variables are also examples of continuous variables. Figure 1 illustrates the classification and difference between Quantitative and Qualitative variables and types of data.

4 Concepts and Constructs

In social research, concepts are the building blocks of theory and they represent the points around in which social research is conducted [4]. The definition of concepts in Business research is not far from the above mentioned approach. A concept in business research is commonly recognised range of connotations or implication related to specific procedures, or phenomenon related to Business studies [1]. For example, a can of coke is an objective concept with characteristic features, which are obviously observable, like weight, height, colour, brand name and label. An abstract concept could include intangible attitudes and feelings (e.g. love). An abstract concept like love requires illustration and exemplification of the specified examples that would better illustrate the meaning of love. An abstract idea like love or personality or vision in organisations is difficult to perceive or visualize and therefore requires further illustration; such abstract concepts are referred to constructs [1, 5]. A construct is defined as a reflection or scientific abstract notion scientifically developed for building theoretical framework. Constructs are developed by joining more basic and concrete concepts, specifically if the phenomenon under investigation could not be directly observed. For example, servant leadership as a constructs is comprised of a set of concepts that would contribute to the building a theory of servant leadership. In a research study on servant leadership across cultures, the construct of servant leadership is developed by identifying core characteristics including egalitarianism, moral integrity, empowering and developing others empathy, humility and creating value for community [6].

4.1 Operational Definitions

An operational definition is a characterisation stated in terms of specific criteria for measurement. Such terms must refer to empirical standards. The subject of definition could be tangible or physical (e.g. a new car model) or intangible (e.g. personality). Operational definitions must identify the characteristics and how they are measured. For example developing an operational definition of charismatic leadership in organisations would require careful design on the components that comprise this variable.

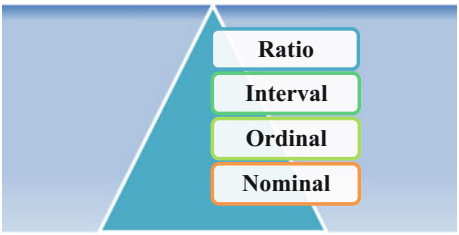

Fig. 2 Measurement levels

5 Measurement Levels

Measurement can be characterised by four levels, which are comprised of classification, order, distance and zero origin [1, 5, 7]. The combination of the mentioned measurement levels in Fig. 2 produces four measurement scales namely nominal, ordinal, interval and ratio scales. The nominal scale is the simplest level where classification only, but no order, distance or absolute zero level could be applied (e.g. gender). The second would be ordinal level where both classification and order are applied (ranking a quality of service from excellent to bad). Third level is interval scale where classification, order and distance but no absolute zero are applied (e.g. temperature). The highest level of measurement is ratio level where all characteristics of classification, order, distance and zero origin are applied (e.g. income, weight, and height).

5.1 Nominal Level

Nominal scale is the simplest kind of level as the numbers and the letters assigned to objects serve as labels for identification or classification [5]. According to Cooper and Schindler (2014), nominal data involves the collection of information on a variable that can be grouped into two or more categories that are mutually exclusive and collectively exhaustive [1]. Nominal data is widely used in surveys when the data is by major subgroups of the population. Classifications of nominal data are such as respondents' marital status, gender, nationality and other related factors. Figure 3 illustrates an example of nominal level. The use of numerical symbols to identify categories at a nominal scale level, is recognised as tags with no quantitative implication. For example, no. 10 for Wayne Rooney, Manchester United player, is not an indication a chronological order or a certain level of skill. This example emphasis is on specifying certain identification of role playing an offensive forward role in the game of football.

Fig. 3 Nominal level

U.K.	U.S.	E.U.	Japan	CM	IN
2	3	34.5	210	21.0	8 1/4
3	4	35.5	220	22.0	8 5/8
4	5	37	230	22.9	9
5	6	38	240	24	9 1/2
6	7	39.5	250	25	9 7/8
7	8	40.5	260	26	10 1/4
8	9	42	270	27	10 5/8
9	10	43	280	28	11
10	11	44.5	290	29	11 3/8
11	12	45.5	300	30	11 3/4
12	13	47	310	31	12 1/4
13	14	48.5	320	32	12 5/8
14	15	49.5	330	33	13
15	16	50.5	335	33.5	13 1/4

Fig. 4 Ordinal level

5.2 Ordinal Level

An ordinal scale arranges and classifies objects according to their degree in an ordered relationship [5, 8]. A typical ordinal scale in business research asks respondents to rate a certain brand for example as excellent, good, fair and poor. The use of an ordinal scale implies a statement of greater than or less than without stating a fixed distance of how much greater or less. For example in Fig. 4, shoes are assigned numbers to represent size, where larger number indicate bigger size [2]. In the UK, for example shoes size could range from 2 to 15. However, one could not argue that that size 8 is as twice as big as size 4.

Fig. 5 Interval level

5.3 Interval Level

Interval scale comprises principle of fixed distance between 1 and 2 and 2 and 3, which should be equal distance [7, 8]. For example, the calendar time is an interval scale. The time between 12:00 pm and 01:00 pm is the same and equal to the time between 03:00 pm and 04:00 pm. However, one cannot say that 04:00 pm is twice late as 02:00 pm because the zero in this example has relative not absolute origin. A classic example of an interval scale is the Fahrenheit temperature scale, show here in Fig. 5 [5]. However if the temperature is 80° it cannot be said that it is as twice as hot as 40°. Many attitude scales are considered an interval such as intelligence scores, semantic differential scales and other multi-graphical scales. When a scale is interval, the arithmetic mean is used as the measure of the central tendency [1, 7].

5.4 Ratio Level

Ratio scale indicates the highest levels of measurement as it contains all characteristics of classification, order, fixed distance and zero origin. Measures including weight, height, distance, population count and other measures. At a ratio measurement level, zero has absolute meaning and indicates the absence of concrete quantity being examined. Money is an example of ratio level of measurement. Figure 6 illustrates an example of a man who has zero money in his pocket. The zero in this example indicates the absence of money [7, 8].

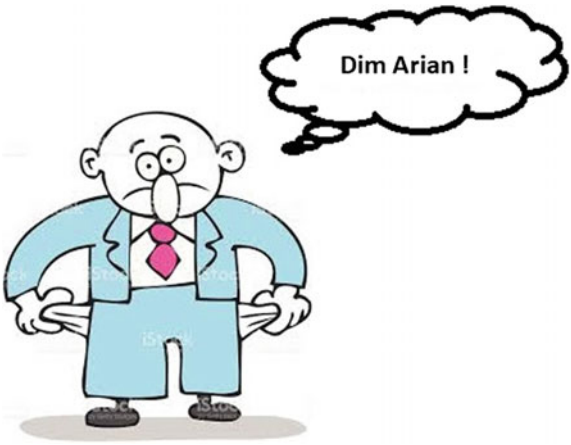

Fig. 6 Ratio level

6 What Is Being Measured?

It is argued that variables examined at research may be defined or referred to as objects or properties [1]. Objects may be defined as tangible experiences and phenomenon as laundry detergent brand, a vehicle or a trainer; or intangible phenomenon as genes, attitudes or leadership behaviours (see Fig. 7).

Properties on the other hand may be defined as the characteristics or attributes of the object. A human being physical properties may include weight, height, and other physical characteristics. Psychological properties on the other hand may include personality, and perceived phenomenon. Social properties may contain social ranking (see Fig. 8).

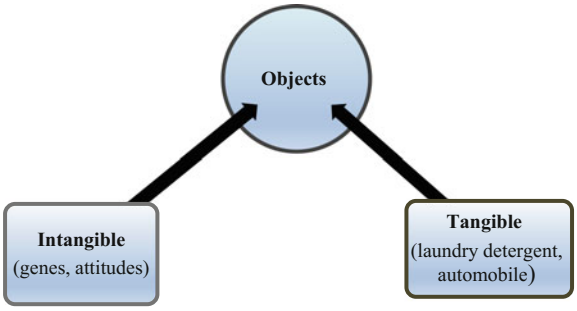

Fig. 7 The measurement of objects

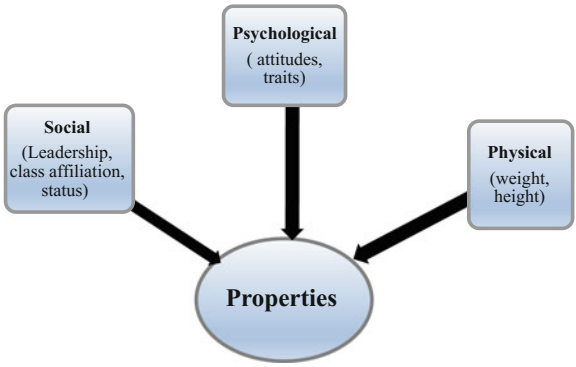

Fig. 8 Measurement of properties

7 The Measurement of Attitudes

The focus of the chapter is Measurement and Measurement scales in Business research. This chapter will focus on measurement of attitudes in behavioural management and business research. The study of attitudes in the workplace, in organisational behaviour and consumer behaviours is frequent and essential in behavioural management research. A good investigation of the nature of attitudes could be realised by a comparison between emotions and attitudes. Emotions are physiological, behavioural and psychological episodes experienced towards an object, person or event that creates a state of readiness [9]. Emotions can be directed towards tangible or intangible events or phenomena. Human beings experience joy, fear, anger, shame, love and other emotional episodes towards other human beings or products, ideas or events [9]. Compared with emotions, attitudes represent a cluster of beliefs, assessed feelings and behavioural intentions meant for a person, phenomenon or object (this is usually known as attitude object). It is argued that attitudes are judgement, whereas feelings are experiences. Attitudes are developed through a combination of different forces including feeling, thinking, personal experiences and values which will lead to shaping behavioural intention and behaviours [10]. An attitude is learned tendency to respond towards one self, or others or events in a favourable or unfavourable manner [1].

This is examined in terms of three cognitive components including beliefs, feelings and behavioural intentions. Let us consider the example of John, a bank employee who works for HSBC Bank. John believes that working for such a winning organisation is very good and that there are good opportunities for growth in the future and career advancement. This is an example of cognitive based attitude. John has an extremely positive evaluation for working at HSBC. He loves being there and holds positive feelings about the management and other people who also work there. This is an example of an affectively based attitude. John also expects to work for years to achieves promotion and career improvement. This is an example of a behavioural based attitude. Feelings, beliefs and behavioural intentions are three components of

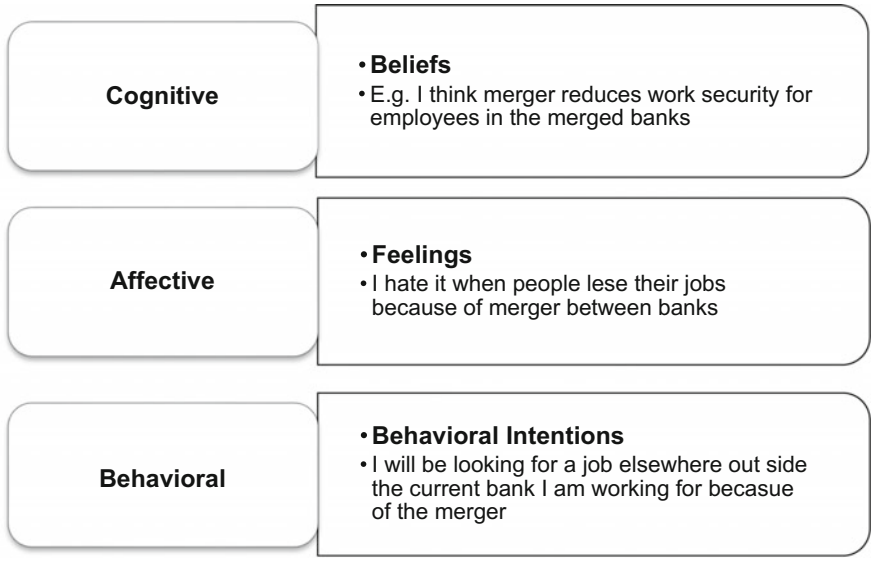

Fig. 9 Measurement of attitudes

attitudes. Figure 9 illustrates three components of attitude. Organisational behaviour studies argues that behavioural intentions are linked to behaviour [7, 9].

The study and measurement of attitudes are significant to behavioural studies in management. The research studies of motivation, job satisfaction, and perceived leadership in organisations are types of research, which require measurement scales related to the above mentioned perceived attitudes. A very frequent example of a measurement scale applied widely in behavioural studies is the Likert scale. Further examination will be provided in scaling response types of the above mentioned scale.

8 Selecting a Measurement Scale

Several factors are to be considered before selecting a measurement scale. These factors include:

8.1 Research Objectives

Research objectives is a crucial factor that needs to be considered before selecting a measurement scale. Considering, for example, the case study of a research, which have the objectives of examining Syrian Consumption patterns before and after 2011,

the year where Syria's political and economic crisis started. The researcher would start with the research question about examining the change in consumption patterns of Syrian consumers before and after 2011. Doing so, the researcher main priority is to develop a methodology where consumption patterns could be measured. This examination will lead to the investigation of consumer needs and desires. Three levels of consumption could identified which includes necessities, substitutes and complementary types of products and services [11]. Consequently, the research should keep in mind the objectives of the research study prior to making decision of the measurement scale, which will be applied in the research study.

8.2 Response Type

Response types can be mainly classified into three types of measurements scales: rating, ranking and categorization [1, 3, 7, 8]. Rating scale is applied when respondents indicates an object without making a direct comparison to another object. A respondent would be requested to code their degree of agreement and disagreement about a certain point on a five-point rating scale. Ranking is used when participants make comparison among two or more objects. A respondent would be asked to compare and select between two or more vehicles. For example, one that is better in qualities or one that that has a more attractive style. Categorization is used as respondents are grouped or categorised according to their gender or ethnic background as the research is directed into certain category.

8.3 Data Properties

The researcher, in the process of identifying the measurement scale in the study, must identify data properties. Data properties include nominal, ordinal, interval and ratio levels. For example, if the research study requires only a simple category scale (yes/no question) then nominal level is applied.

8.4 Number of Dimensions

The number of dimensions could be unidimensional or multidimensional. A unidimensional scale examines the measurement of one attribute of the subject of analysis. A multi-dimensional scale examines the subject of analysis employing several dimensions.

8.5 Balanced or Unbalanced Scale

A balanced measurement scale has an equal number of points above and below the midpoint. For example, the Likert scale (which is one type of the rating scale) is balanced with an equal number of agreement or disagreement response choices. An unbalanced measurement scale has an unequal number of favourable or unfavourable response choices.

8.6 Forced or Unforced Choices

An unforced measurement scale is designed to provide the respondent with the possibility to express an opinion. A forced measurement scale requires that respondents select one of the responses. Responses including "I do not know", "No Opinion", "uncertain" or "neutral" are examples of an unforced measurement scale response choices.

8.7 Number of Points in a Measurement Scale

A measurement scale in a research study should clearly identify the number of points needed to suit the needs of the study.

9 Rating Scales

Rating scales are used to judge properties or objects of study without reference to other similar objects. Different sorts of rating scales contain simple category, multiple choice scales, Likert Scale, Semantic Differential, Numerical, multiple rating, constant sum, staple and graphic rating [1, 8]. Figure 10 illustrates different types of rating scales.

9.1 Likert Scale

Likert scale consists of statements that express either a positive or a negative attitude towards the objects of study [2]. The respondent is asked to agree or disagree with each question. Each response is given a numerical score to reflect its degree of attitudinal favourableness. The score will be calculated totally to measure the respondent attitude. In this research study respondents are asked to code their agreement

Simple Category Scale **Level** : Nominal	Do you have experience in collaboration with business? **Yes** □ **No** □
Multiple choice single response scale **Level** :Nominal	Which magazine do you read? □ **Financial Times** □ **The Economist** □ **Financial Post** □ **The Financial Express** □ **Other (Specify ----------)**
Multiple choice multiple response scale **Level** : Nominal	In general, what are the evaluation criteria of the academic staff at your faculty? Please check all options that apply. □ **Teaching quality.** □ **Research activity; publications.** □**Research activity; projects with enterprises.** □**Writing textbooks.** □**Supervising Master and PhD students.** □**Other, please specify:**
Fixed Sum scale **Level:** Ratio	Taking into consideration the product provided and considering perceived value gained from the product, what is the relative importance of the following factors to you? (dividing 100 between) Price Quality Sum 100

Fig. 10 Rating scales

degree of how frequently the person, they perceive as a leader, is capable of engaging behaviours presented in the questions. The respondent chooses one of the five levels of agreement. The numbers indicate the value to be assigned to each answer with 1 which is strongly agree and 5 which is strongly disagree (see Fig. 11).

Likert scale **Level:** Interval	The working conditions of researchers in your institution /faculty are satisfactory **Scale:** **1-Strongly Disagree** **2-Disagree Agree** **3- Not sure** **4-Agree** **5-Strongly agree**

Fig. 11 Likert scale

SD scale for candidate analysis for criteria of selection The Candidate for the current position is										
Friendly	**7**								**1**	**Aggressive**
Frail	**1**								**7**	**Robust**
Proactive	**7**								**1**	**Reactive**
Extrovert	**7**								**1**	**Introvert**
Lazy	**1**								**7**	**Energetic**
Honest	**7**								**1**	**Deceitful**
Professional	**1**								**7**	**Unprofessional**
Emotional	**7**								**1**	**Emotionless**
Communicative	**1**								**7**	**Incommunicative**

Fig. 12 Semantic differential scale

9.2 Semantic Differential Scale

The semantic differential (SD) scale measures the psychological meanings of an attitude object using bipolar adjectives. The method comprises with a set of bipolar rating scales with usually a 7 points where respondents rate the concepts of study on each item scale. Example of a semantic differential scale include marketing research studies. For example marketing research study could explore customer perception of the quality of customer service in the target retail stores under investigation. In some studies, the SD scale is applied for candidate evaluation in a specific business sector. Required attributes and characteristics that the candidates should possess to be successful in performing their work are listed in Fig. 12.

9.3 Numerical and Multiple Rating Scales

The numerical scale is employed to measure equal intervals. The adjectives employed in scale function as labels for extreme values. It provides numerical score of the responses in the scale. Both sematic deferential and numerical scales employ bipolar adjectives. However, the numerical scale provides numerical scores, whereas semantic deferential provides semantic space as a means of identifying response. There is a similarity between multiple rating scale and numerical scale as both are employed to measure equal intervals. The scales differ in the layout (see Fig. 13).

Numerical scale **Level:** Interval	Please evaluate the impact of each of the following factors on the development of your scientific research activity. Please identify using the following scale.					
	Absolutely Influential	**5**	**4**	**3**	**2**	**1**	**Absolutely not Influential**
	1-Availability of knowledge about the existence of open access databases						
	2-Availability of information about international conferences						
	3-Availability of university/faculty scientific journals abroad						
	4-Availability of information about scientific projects						
	5- Availability of statistical databases						
	6- Collaboration with international researchers						

Multiple rating list scale Level: Ordinal or Interval	**Least Preferred Co-worker (LPC) Measure** Instructions: Think of the person with whom you can work least well. He or she may be someone you work with now or someone you knew in the past. That person does not have to be the person you like the least but should be the person with whom you had the most difficulty in getting a job done. Describe this person as he or she appears to you by circling the appropriate number for each of the following items.								
	Pleasant	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**Unpleasant**
	Friendly	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**Unfriendly**
	Rejecting	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Accepting**
	Tense	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Relaxed**
	Distant	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Close**
	Cold	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Warm**
	Supportive	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**Hostile**
	Boring	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Interesting**
	Quarrelsome	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Harmonious**
	Gloomy	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Cheerful**

Fig. 13 Numerical and multiple rating scales

9.4 Staple Scale

The staple scale was developed in the 1950s. It is designed to measure the direction and intensity of an attitude. The scale has similarities with the semantic deferential scale. The staple scale positions a single adjective or a statement for analysis at the centre of an even number of numerical values (usually from +5 to −5). The scale measures how close or distant from the adjective a given stimulus is perceived to be (see Fig. 14).

9.5 Graphic Rating Scale

Graphic rating scale is designed to enable respondents to distinguish fine differences. When applying the graphic rating scale, respondents are asked to indicate their answer

Please evaluate the performance of XY organisation according to the following factors and rating criteria where +5 indicate the most accurate and -5 the least accurate description of the organisation		
+5	+5	+5
+4	+4	+4
+3	+3	+3
+2	+2	+2
+1	+1	+1
Product Leadership	**Customer Service**	**Operational Excellence**
-1	-1	-1
-2	-2	-2
-3	-3	-3
-4	-4	-4
-5	-5	-5

Fig. 14 Staple scale

How satisfied are you with quality the service in your institution/ faculty?
Very Much Not at all
☺ ----------☹

Fig. 15 Graphic rating scale

at the scale. The participant response will be measured by millimetres and considered as interval data. Figure 15 illustrates the graphic rating scale.

10 Ranking Scale

The ranking scale is designed to enable respondents to directly compare two or more objects and make evaluation about them. In the case of the ranking scale, the respondent is instructed to indicate the first or ultimate favoured choice. The ranking scale is comprised of three types. They are illustrated in the following sections.

10.1 Paired Comparison Scale

In certain research studies comparison between more than two subjects of analysis is required. In this case there is a need for the application of paired comparison scale. The paired comparison scale enable respondents to compare preference between more than two objects. A paired comparison scale formula is designed to provide comparison between each pairs. The number of response required in a paired comparison is determined through the following formula: $[(n)\ (n-1)/2]$ where n is the

Considering every couple of the carbonated drink brands, indicate your greater preference of the pair	
-----Pepsi -----Coke	----- Coke ----- Dr. Pepper
-----Pepsi -----Dr. Pepper	----- Coke ----- 7Up
-----Pepsi ----- 7 Up	----- Dr. Pepper ----- 7 Up

Fig. 16 Paired comparison scale

number of objects under examination. For example, according to the above mentioned formula in a marketing research study, with the objective of comparing preferences of four carbonated drinks brands, the number of paired comparisons would be: [(4) (3)/2 = 6]. Figure 16 provides illustration of the paired comparison scale.

10.2 Forced Ranking Scale

The forced ranking scale provides respondents with the ability to rank their preferences. The advantages of this scale include simplicity compared to paired comparison scale, where respondents relatively easily respond preferences choices of the objects of study. However, when the number of stimuli or object of study increases, and possibly exceeds 10 objects, it could be a process where respondents might lose their focus or interest in responding accurately. In the case of MATRE research study on research environment on Syrian Higher Education, some respondents provided duplicated responses in the case of question 15, where they ranked more than a factor as their first choice. The result for this response resulted in duplication of responses [12]. Figure 17 illustrates the forced ranking scale, which was employed in MATRE study in question 15.

Fig. 17 Forced comparison scale

15.Scale your research motivations (Rank from 1 to 5, where no. 1 indicates the strongest one, no. 2 indicates the second, until the last number which is no. 5):

☐Tenure-required conditions

☐Financial benefits

☐Business Request

☐Career improvement

☐Others, specify:

Compared to your consumption before 2011 of necessity, substitute, and complementary products, would you consider your current consumption as more or less. Indicate the change in your consumption according to the following scale **Scale: 1-Much more, 2-More, 3-About the same, 4- Less , 5-Much less**	**1**	**2**	**3**	**4**	**5**
1- Consumption of bread	□	□	□	□	□
2- Consumption of medicine (painkillers)	□	□	□	□	□
3- Consumption of tea	□	□	□	□	□
4- Consumption of clothing	□	□	□	□	□
5- Consumption of jewelleries	□	□	□	□	□
6- Consumption of vehicles	□	□	□	□	□

Fig. 18 Comparative scale

10.3 Comparative Scale

The comparative scale is designed to enable respondents to make comparison between two objects of analysis, where usually the respondent is familiar with the standard. In the example of research study, investigating the change of Syrian consumption patterns before and after year 2011, the researcher examines carefully the response types, which best suits the needs of the research study. Figure 18 illustrates comparative scale question with the aim of measuring a comparison of consumption patterns of necessities, substitutes and complementary products before and after 2011, the year in which the beginning of Syrian Crisis is indicated.

11 Conclusion

In conclusion, this chapter examined the subject of measurement and measurement scales in business research. The meaning and significance of measurement is defined with a scope of business research and behavioural management. Measurement in behavioural management and marketing research is investigated. The nature of attitudes is explored differentiating between levels, which establishes the foundation of attitudes such as feelings, thinking and behaviour. Measurement levels are examined including nominal, ordinal, interval and ratio levels. This chapter also examined different levels of measurement scales including rating, ranking and categorization. This chapter provides a simplistic approach of measurement and measurement scales in business research.

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Common Biases in Business Research

Sulaiman Mouselli and Hiba Massoud

1 Biases in Quantitative Business Research

Quantitative research in business is characterized with extensive use of numerical data which could be time-series, cross-sectional, or panel that requires the application of various estimation techniques. This exposes researchers to a unique set of biases when conducting such quantitative type of research in business. The following discussion illustrates the definition, sources, consequences and possible remedies of biases that face quantitative researchers.

1.1 Sample-Size Bias

Researchers usually prefer larger sample size on smaller ones in an attempt to increase the precision with which they can estimate population parameters. Under normal conditions, a larger sample size increases the reliability of estimates, reduces the standard error in *t*-statistic, and increases the probability of rejecting the null hypothesis of insignificance. However, Shajani (2015) explains that two risks may arise in the attempt to increase the sample size [2]:

Firstly and mainly, sampling from more than one population. Increasing the sample size may result in drawing observations from different population and consequently lead to misleading conclusions. For example, the inclusion of certain sectors in financial markets research may alter the results towards the dominant sectors in the market, which is the financial sector (banking and insurance) or the dominant sector in many developing financial markets. Moreover, researchers are usually prone to

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include companies from the financial sector in their asset pricing tests despite their special characteristics on the aim to increase the size of their samples. This means that estimates and conclusions drawn from such samples will be erroneous.

Secondly, increasing the size of the sample usually results in additional expenses that may outweigh the benefit of increased accuracy of estimates. It is necessary to remember that a large biased sample is no better than a small unbiased one.

1.2 Data Mining Bias

Data mining bias refers to the error that results from extensively searching a data set for statistically significant relationships until a desired pattern is discovered [2]. During such process, large number of hypotheses about a data set are examined quickly, usually without a plausible theoretical background, by looking for combinations of variables that might show a relationship. Researchers may also be prone to split their samples into subsamples that confirm a certain desired conclusion.

Given that a large number of hypotheses are tested and many subsamples are tried, it is expected that some hypotheses will appear to be highly statistically significant although they are purely coincidences. Data mining bias most frequently happens when:

First, researchers have not formulated a hypothesis beforehand and are therefore vulnerable to any hypothesis suggested by a data. For example, when studying factors that affect stock returns, researchers throw all available variables (accounting and economic) in the model and hope to figure out a number of significant relationships. Then, they try to explain these relationships which usually lack any economic meaningful story.

Second, researchers select certain data or testing period in order to increase the likelihood of the sample accepting or rejecting a certain hypothesis. Sample selection needs to be appropriately selected and any exclusion should be clearly justified. For example, splitting the main sample into two subsamples on the basis of the introduction of new accounting standards or regulations is reasonably justified. However, doing the same sub-sampling without such justification is not usually accepted and is a source of great concerns.

Third, when data is constructed on some empirically motivated characteristics instead of theoretically motivated characteristics. Lo and MacKinlay (1990) find that misleading inferences may result from asset pricing tests when the underlying tested portfolios are constructed on the basis of the same certain properties used to construct the examined risk factors [3]. Fama and French (1993) use 25 size and book-to-market portfolios to test the explanatory power of their three-factor model [4]. Those portfolios turn to be the standard testing portfolios in any evaluation of asset pricing models. However, these portfolios are constructed on the basis of empirically motivated characteristic of the stock, such as market value and book-to-market ratio rather than a theoretically motivated characteristic, such as dividend yield, or a market-based characteristic, such as industry sector. The results of such

tests will be biased toward out-weighting risk factors that are constructed in a similar way to those of the tested portfolios.

Data mining biases are also apparent in testing the performance of a number of technical trading rules in Finance. Researchers tend to continue examining trading rules that worked in the past and ignore those that did not success. In other words, they are using the same dataset to construct trading rules and to test them which clearly prefer one trading rule on others [5].

To test for data mining bias in the trading rule example, Sullivan et al. [6] and White [7] suggest the use of bootstrapping through placing the examined trading rule in a universe of broadly similar trading rules and testing the whole universe of trading rules before reaching a conclusion on the successful trading rule [6, 7]. The bootstrap should be applied to each trading rule through the use of sampling with replacement from the time-series of this trading rules observed returns. The significance level from the bootstrap test can then be used to examine if superior technical trading rule really exists.

Fourth, when certain estimation method has been adopted to the dataset with neither a clear justification of the selection of this methodology nor a discussion of the advantages and disadvantages of the adopted model and other possible methodologies. Researchers tend to apply Ordinary Least Squares (OLS) in their model estimation and hypothesis testing while ignoring other more robust estimation techniques such as Maximum Likelihood (ML) and General Method of Moments (GMM).

There are a number of warning signs that data mining bias might exist. One of these signs is when too much digging to reach the conclusion is noticed. This usually involves testing numerous variables and trying subsamples until one relationship that appears significant is discovered. Another sign is when no plausible story can be reached from the claimed significant relationship. Furthermore, it could be a sign of a bias when the researcher does not provide enough robustness tests to support her empirical results.

The best way to avoid data mining bias is to clearly justify the sample selection and to provide full rationalization of the model estimation and hypothesis testing methods supported by prior research in addition to "out-of-sample" tests to check whether the apparently significant relationships continue to hold.

The idea of out-of-sample testing is essentially that data not used in model estimation, is used for model testing. In other words, data should be divided into two sets; training and test sets. The training set uses part of the data and is necessary for the development of the model and test set, that uses portion of the data, for testing the model that is built. It is expected that if a model is built on the basis of a particular set of data, the model will of course test quite well. However, if you split the data into two parts and using one part for model development, and testing the model on the basis of the second, a more convincing test of the model accuracy is obtained [8]. Hence, a spurious relationship that is observed in the estimation period and that is merely due to data mining is very unlikely to be repeated for the out-of-sample period. In other words, models that are the product of data mining are unlikely to fit well in out-of-sample tests and are expected to show different results.

1.3 Sample-Selection Bias

It is the bias that results from the elimination of certain observations (such as firms, funds or assets) from a study due to different reasons. The work of Heckman (1979) argues that there are two reasons for sample-selection bias to appear in practice; "*First, there may be self selection by the individuals or data unit being investigated. Second, sample selection decisions by analysts or data processors operate in much the same fashion as self selection*" [9].

This bias could also be a database-specific that results from using historical information and suffers from a type of sample-selection bias known as survivorship bias. Survivorship bias results from using a dataset that only includes the survivors during the sample period, not the complete set of firms that were available over the period [10]. Many databases suffer from this bias especially those that only list firms or funds that currently alive (for example, Compustat for United States accounting information), which means firms that have failed are not included in the database. Consequently, results obtained from the study will be biased towards firms or funds that are successful and may not accurately reflect the true picture.

Sample selection bias is even worse in studies of credit rating and hedge fund returns. If firms that would have received lower credit ratings (because they have weak financials) opt not to request a rating, results of the determinants of credit rating will only be valid for firms with high credit rating, and coefficients will be inconsistent [5]. Similarly, because hedge funds are not required to publicly disclose their performance data, only funds with good performance will choose to disclose their performance. Hence, hedge fund returns will be overestimated and coefficient estimates will be inconsistent.

To control for sample-selection bias in hedge fund studies, Heckman (1979) suggests two-step procedure that involves first estimating a 0–1 probit model of whether the fund solicits to disclose its performance and second estimating the ordered probit model for the determinants of the performance of hedge funds [9].

A common bias in sample selection occurs also when a researcher selects the sample from the currently available observations and ignores firms that disappear during the sample period. This type of bias mixes the sample selection bias with look-ahead bias because it only includes firms with available information at a certain recent point of time. One way to avoid this bias is through considering all dead and live cases (firms) during the whole sample period.

1.4 Look-Ahead Bias

Look-ahead bias can be defined as "*the use of information in a simulation that would not be available during the time period being simulated, usually resulting in an upward shift of the results*" [11]. This type of bias arises when a researcher includes

data that would not have been known or available at the time period being tested. Including such data will compromise the accuracy of the results.

For instance, the incorrect assumption that accounting data become available instantaneously at the end of the fiscal period is a source of look-ahead bias. A trading rule built on the basis of financial ratio such as book-to-market ratio cannot be constructed until data on book value is released in the financial statements of the company otherwise the true performance of the trading strategy being tested is falsified. Many studies recognize this fact and choose to construct portfolios at the end of June each year to give investors enough time to know, absorb and construct portfolios on the basis of book-to-market ratio that is usually made available after the end of December each year.

1.5 Time-Period Bias

The results of a test will be biased if it is based on a certain specific time period and results of such test are usually referred to as time-period specific [2]. Researchers usually face the dilemma of the choice between short and long time periods. A relatively short-time period raises the doubt that the results are only valid during that particular period. On the other hand, a very long time period may fail to uncover structural changes that took place during that period. This type of bias is highly likely to exist as a result of some unique changes during other periods. Such bias could result in having the research results working well during a specific time frame but not working good for extended time periods.

For example, business related research regarding the Syrian external trading activities (exports and imports) trends done before 2011. If those same studies are carried out in 2018 for a 10-year timeframe, the conclusions certainly would be different. The same could be said about Damascus Securities Exchange performance-related research. Circumstances have changed dramatically after the political crisis that took place in 2011. Researchers could not consider time periods before and after this crisis homogeneous and therefore they should avoid time series overlapping years before and after 2011 or address it using dummy variables or other suitable techniques.

Researchers should ideally choose their studies' time periods carefully. This should be done after understanding the nature of data in its environment, then studying and testing time frames towards unique effects or circumstances, in order to ensure that the results are not period-specific or environment-specific. Such bias will hinder the possibility of generalizing conclusions and consequently limits the usefulness of study results.

1.6 Omitted Variable Bias

When applying the Ordinary Least Squares (OLS) technique in model estimation, researchers sometimes intentionally or unintentionally drop one or more important explanatory variables. The bias is created when the model compensates for the missing variable through over- or underestimating the importance of the remaining included explanatory variables.

Omitted variable bias may present in two occasions. On one hand, researchers may exclude explanatory variables from the estimated model in the presence of multicollinearity. On the other hand, researchers may not be aware of certain important explanatory variables and consequently do not include them in the model. However, if the removed variable was relevant in the data-generating process of the dependent variable, an omitted-variable bias will result [5].

Omitted variable bias can be easily detected by the magnitude and significant of the intercept term of the estimated model. A large and highly significant intercept indicates that one or more important explanatory variables are missing from the model. The researcher should give enough care to the theory behind the model and should not be driven only by previous empirical results.

2 Biases in Qualitative Business Research

The following types of biases occur mainly but not exclusively in qualitative business research.

2.1 Sample-Size Bias

Qualitative research is highly likely to use quantitative sampling techniques when the generalizability is their ultimate goal and therefore could encounter a number of related sampling biases similar to those related to quantitative research. Sampling from more than one population is also a source of bias in qualitative business research. Increasing the sample size may result in including observations from different population and consequently lead to misleading conclusions. For example, in questionnaires to investigate the views of small size population (for instance, the higher management levels) where fewer numbers of observations are available and usually difficult to get hold off, researchers are usually prone to reclassify managerial levels or include lower management levels in the sample. This will bias the results of the study and may lead to different conclusions.

Researcher should bear in mind that there is neither a universal answer on the ideal sample size, nor a universal rule for calculating the size of samples for qualitative research [12]. Therefore, instead of focusing thoroughly and solely on increasing

sample size, the researches should be concerned about other important issues in sampling, such as judgment. In sampling, judgments have to be made about some important issues enlightened by the nature and coverage of the study as well as the types of questions to be answered and the way to answer them. These issues includes access, representation, the quality of data and strategies of sampling [13].

Determining the size of qualitative research sample should be made in the light of a number of criteria such as the research purpose, question and design, the population size and its heterogeneity or homogeneity, the confidence level and confidence interval required, the accuracy required, the likely response rate, and the type and number of variables used for statistical tests. Some guides to test sample adequacy are available. Easterby-Smith et al. [14] provides a formula that gives an indication of the sample size adequacy that could be used for both quantitative and qualitative research. This formula, however, could only be used as an indicator given that the researcher has some good information and understanding about the research population. The sample size indicator formula allows the researcher to form an opinion on the adequacy of his sample size by comparing it to n being the required sample size as calculated using the occurrence of the condition (state) P and the maximum error required E, as:

$$n = \frac{P \times (100 - P)}{E^2}$$

Another way of testing sample size adequacy for generalizability purposes; is the ratio of entries (observations) to independent variables. This is particularly useful when quantitative techniques are used to analyze qualitative data. In essence, this ratio should be greater than 15 entries (but preferably greater than 20) for each independent variable. This means that there should be 20 entries (observations) for each independent variable. For example, if the study involves 8 independent variables, the sample size should be greater than 160 observations. Whereas, the higher the ratios of entries to independent variables, the lower the risk of making the results too specific to the sample "overfitting" as this decreases the generalizability of the results [15]. However, when generalizability is not an ultimate goal for a qualitative research, it could be useful to study in detail small samples. In such cases, the two techniques suggested above become irrelevant and it is then up to the researchers to try to justify and amend the size of their sample to meet their research goals.

2.2 Sample-Selection Bias

Representativeness is a very important factor to consider when selecting the study sample as this leads to stronger sample external validity and increases the confidence in the generalizability of the survey results to the targeted population. Therefore, describing the relationships between samples and their populations is very significant. In order to convey such a relationship, the researcher must be able to describe it in

terms of characteristics that are common to both the sample and its parent population [16]. Again, this requires the researcher to know a lot about the population. Such available information about both the characteristics of the sample and its population allows examining the representativeness of the sample and possible biases using tests such as the *t*-test. If a bias is detected, this could be due to many factors such as sample design and coverage, and non-response.

It is also common that researchers are unable to reach all members of a target population for a number of other reasons such as being unable to get the needed permission to access the data, in addition to time and resources limitations. In such cases, the researcher must identify that portion of the population which is accessible. However, difficulties might lead researchers sometimes to use non-probability sampling such as choosing the respondents because being easy to access or have links with some already accessed observations or respondents such as surveying customer satisfaction or investors decisions by using friends' network or work-based networks. This is called convenience sampling. Researchers may also use snowball sampling based on the reference of some respondents. These sampling processes are highly likely to result in having biased samples which include specific types of respondents (respondents sharing similar characteristics) and exclude others [17]. Furthermore, such processes give well socially connected respondents higher chances of being selected compared to others who are less socially connected [18].

Researchers are advised to plan their sampling and to identify the kind of sampling strategy (qualitative) they require (probability, non-probability, or mixed methods sample). When using probability sampling, all members of the population have equal chances to being included; the choice to include them in the sample is purely random and based on chance. The aim is for generalizability and wide representation and this lead to less risk of bias in the sample. For non-probability sampling, researchers should understand their samples and need to be aware of how samples' shortages could affect the generalizability of their research results.

2.3 Measurement Bias

Researchers need to be careful when using data that are collected for specific reasons or when changes introduced to the way data are collected [19]. Data, recorded erroneously on purpose, suffers from deliberate distortion problem, which is very common when using secondary data sources such as corporations' reports and their related records. For instance, the turnover rate of part time or hourly based employers might be intentionally ignored in the reports to enhance such indicative ratio. Similarly, bad environmental practices might deliberately be allocated smaller paragraphs providing minimum details in the social responsibility reports compared to good environmental practice in an attempt to signal better performance by manipulating readers' opinions. Deliberate distortion is more pronounced when data is collected for specific reason and/or for the interest of a particular group. Another good example for this type of bias might occur when consumer satisfaction sur-

veys are prepared by employees who tend to underestimate and give low credit to customers' undesirable observations and notes in an attempt to show better service quality levels to their supervisors, management teams and stockholders.

One way to deal with this deliberate distortion problem is through cross-check verification of data [20]. That is to triangulate the findings of main study with one or more independent data sources. Consequently, researchers and reviewers will be more confident of the data used in the research and less doubtful of the conclusions they reach especially if they are inconsistent with previous results.

A change to the way data are collected is a major source of measurement bias. Once data collection method changes, a bias occurs whether because of altering members of the data collection team or modifying the procedures used to collect data. Hence, there is a possibility to reach different conclusions. This is a very serious issue for data based on questionnaires, which are adjusted from time to time such as Corruption Perception Index issued by Transparency International and for longitudinal surveys such as the Price Indexes where researchers focus on trends development [19]. However, government-sponsored sources are more likely to announce such changes than within-company sources. Hence, researchers should be warned of such measurement bias and need to take them into account when reaching conclusions or commenting on them.

2.4 Interviewer Bias

This type of bias occurs when the comments, tone, language style or non-verbal behavior (such as, facial expressions, body language and dressing ways) of the interviewer affect how interviewees react when questions are posed by the interviewer [19]. Social status, race and gender can also produce bias. Additionally, bias happens when the interviewer unconsciously enforces his/her own believes in the way he/she is imposing the questions. When interview questions are biased, they influence interviewee's answers. Leading questions, misunderstood questions and unanswerable questions are examples of biased questions. The order of questions could also be one source of bias. Furthermore, bias will also occur in the way the researcher interprets responses. Interviewer bias challenges the validity and reliability of research when the researchers do not start by building trust with their respondents. This could generate lack of confidence or credibility by the interviewees.

Some of the interviewer biases are unavoidable, but many of them could be reduced or controlled. For example, the interviewers' body language and gestures should not be excessive. The way they look and talk should also be as neutral as possible. They should not give opinions while collecting data and should try to avoid all sources of question bias.

2.5 Interviewee or Response Bias

Interviewee bias is a major issue in in-depth and semi-structured interviews as this is likely to affect the quality of data collected by researchers. This type of bias occurs when the respondents consciously or unconsciously misrepresent the truth [21]. The Interviewee may initially accept to take part in an interview but may still be sensitive or uncomfortable when it comes to the unstructured exploration of particular topics. Hence, they intentionally mislead researchers by giving false answers in order to hide their lack of knowledge or to avoid embarrassment. Providing false answers could also be stimulated when the interviewees faced sensitive questions or get ask about critical information, which they do not have the authority to reveal or do not want to discuss with the interviewer. Such misleading behavior, of providing untrue answers for some of the questions, will result in a mix of true and false parts of an incomplete picture that the interviewer might try to draw regarding the situation, incident or organization they are trying to investigate and study.

Another aspect in interviewee bias is the type, characteristic, nature, positions and grade of the respondents who accept to take part of the research as interviewees [19]. Given the fact that interviews are time-consuming and could require the interviewees to undertake some follow up before and after the interview (to arrange and then check contents), there will usually be a reduction in the willingness to be interviewed for those who initially agreed to take part in the research. This issue needs to be taken into account through proper sampling.

Different respondents' circumstances, intentions, or un-intentions lead to different types of interviewee biases. For example, consistent biased answers may be noticed when respondents try to maintain consistency in their answers. This leads all their next answers to be influenced by their earlier answers. Although the first answer and some other following answers might be true, some of the following answer statements might be untrue. Bias could be caused by a dominant respondent; this type of bias is likely to happen during focus groups where some interviewees could influence the opinions and answers of the others by dominating talks time, vocalizing their experience and knowledge, positions, attractiveness, etc. Overestimation is another bias that might be associated with focus groups. This type of bias occurs when respondents overstate their reactions, opinions, or answers because of being influenced by the group's thoughts, actions, and expressions. Some interviewee bias types could be related to psychological status of the interviewees. For example, extreme feelings bias could occur if an interviewee is in an extreme mood state. The moods of such interviewees could affect their cognitions, and their answers could reflect their moods. Angry people tend to provide angry or pessimistic answers. Busy or work-stressed people may provide short and brief answers. In the same regards, it is also possible that some interviewees may get angry with the interviewer or the interview settings. An opposite case, however, may be noticed when an interviewee chooses his/her answers to satisfy the moderator, sponsor, or interviewer. Respondents may also tend to provide socially acceptable answers that are not true causing social acceptance/desirable bias.

Another feeling related bias could arise during interviews related to politics in non-democratic countries where respondents are reluctant to give their opinions regarding political issues, parties or public figures because of the fear of possible consequences and/or punishments. In similar reactions, respondents would rather not talk in response to questions tackling sensitive subjects. Respondents may also choose to give false answers to hide secrets, causing sensitivity bias. Finally, some bias could be a result of errors where interviewees forget or have fade memories.

The researcher must be aware of the possible interviewee biases and respond according to the type of bias expected. Some advices are choosing a suitable time and place for the interview, checking the mood state of the interviewees and building trust with them. Judging the answers of the respondents helps in assessing their truthfulness or exaggeration. In such cases, researchers should ask for clarification and challenge the respondents in a friendly way without revealing too much about themselves. Projective techniques or indirect questions are sometimes helpful, especially with sensitive topics. Managing people during interviews is very important, especially during focus groups as it involves more than five respondents and could involve different types of bias. Dominant respondents should be kept in check and other respondents should be allocated equal talk time.

2.6 Observer Bias

This bias may occur when observers alter the outcomes of a study due to the way they interact with subjects in the study and in what observers choose to see [19]. This bias happens because an observer cannot detach him/herself from the social phenomena he/she is trying to study or avoid, depending on his/her previous experience, culture, attitudes, beliefs, feelings, views, state of mind, reference, error and personality. He/she tries to interpret and analyze the study data or report its results. The conscious and subconscious are in play and researchers are human. Hence, although observer bias cannot be completely eliminated, researchers should be aware of the consequences of such possible bias on the reliability of their data collection, analyses and reporting. They should acknowledge it and seek ways to control it. For instance, if a researcher believes that firm performance is not related to the percentage of female representation on the board of directors, then he will tend to formulate his hypothesis to reflect his believes and tend to interpret his findings accordingly.

There are two main methods to avoid such bias. The first method is self-verification where the observer asks himself questions about his conclusions. For instance, he can ask himself: did the answers received really meant that? and other possible interpretations that could be put forward. The second method is informant verification. If observers rely on informal discussions to reach conclusions, they can write their conclusions from these discussions and ask their informants to verify the content and may be suggest alternative conclusions.

2.7 Transformation Bias

As seen earlier, both quantitative and qualitative methods of research try to achieve the highest possible levels of reliability and validity of their measures of social reality away from biases. In qualitative research methods, the measures are considered valid when they produce the right answers (non-falsified) and will be consider reliable, when they are trustworthy by producing consistent and replicated answers when the same or other similar measures are used. The application of these positivist measurement concepts to qualitative research is deemed inappropriate by a number of scholars. They criticized and denigrated the process of collecting and analyzing qualitative data as well as the way they apply to reach conclusions for the high likelihood of them being subjective. Qualitative researchers try to take steps to reduce errors and bias (such examples steps are explained above).

The choice of qualitative or quantitative methods or data, however, is a matter of what is suitable and appropriate for the topic being searched and the research question being asked. Many quantitative research studies gather and analyze data of qualitative nature that contributes to addressing specific research questions. Some other research questions may require mixed research methods. Quantitative analysis of qualitative data is common in management and accounting research. In order to quantitatively analyze qualitative data, qualitative data needs to be transformed into quantitative formats. A number of available methods could be used to transform qualitative data into quantitative formats. These methods include scoring, ranking and codifying.

Qualitative data used in quantitative research is likely to face two different categories of research bias sources. The first category of bias sources is associated with its qualitative nature. Therefore, it could be vulnerable to bias of qualitative research, such as measurement bias, interviewer bias, response bias, observer's bias or other biases associated with qualitative data, as explained earlier. The second category of bias sources is associated with the process of transforming qualitative data into quantitative formats through scoring, ranking or codifying.

Transforming qualitative data into quantitative formats involves data transformation bias. Such bias are related to the level of researcher's personal judgment exerted during the transformation process. The judgment itself decreases when the transformation technique is straightforward and increases when the technique gets complicated. This depends on the type and the level of informativeness of the qualitative data to be transformed. For example, it is simple to code a response of yes/no into a binary variable. However, it is quite complicated to code a writing text (or contents) into various categories to capture the interests of the writer and his importance (for example, disclosure quality and corporate governance quality). The more complicated the coding, the more the researcher's judgment applied and the higher the likelihood of making transformation bias.

To minimize such data transformation bias, it is important for the researcher to develop tools such as; classification schemes, check lists, selection criteria, decision

rules and coding protocols. These tools help to make replicable and valid inferences from data according to their context.

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Research Ethics

Maya Azoury, Bassem Kaissi and Latifa Attieh

1 Understanding Business Ethics

1.1 Defining Research Ethics

Ethics in the generic form stem from values and moral conduct. They are the collective rules which are designed to help us distinguish between appropriate and inappropriate behavior. Ethics and ethical rules are to be abided by every time humans interact in the multitude of forms they may interact in; be it in a social or business setting. Undergoing a research also dictates a high commitment to ethics and ethical behavior throughout the research proceedings. Many thinkers analyzed and discussed thoroughly the topic of ethics in research. Kavanaugh (2001) defines ethics not only as a value, he stresses that it is an 'intrinsic personal value' vividly present with us; all the way through our personal and professional dealings [1]. Other authors such as Cooper and Schindler (2006) describe the goal of ethics in a research process as one, guaranteeing no party is 'harmed' in any way or form physically or emotionally or that it would eventually 'suffer adverse consequences from research activities' [2]. Saunders et al. (2009) use the term 'appropriateness' to describe how ethical rules alter one's behavior and they continue to explain the rights of all persons who would or could, now or at any future moment, become affected by the researcher's behavior [3]. These persons could be the participants in the research study or persons related and/or affected by the research and/or the research topic and proceedings in one way or another. It is important to remember that ethical issues in research spread to appropriateness in the techniques used throughout research and the later appropriate use of research results [4].

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1.2 Why Is Research Ethics Important?

One may wonder why issues of ethical nature are so essential. The importance of research ethics is fundamentally vested in how it demarcates the unequivocal reliability, the validity of the research in its entirety, the conclusion that the research reaches and its trustworthiness in validated information to assist in better decision making. The researcher's actions and behaviors depicting moral standards and responsibility in its research from start to finish will ensure to much higher degrees that the research methods used. The researcher's understandings of phenomena and findings are to a large degree dependable and could lead to more generalizable facts. "Ethical issues cannot be ignored, as they are directly related to the integrity of a piece of research and the disciplines that are involved" ([5], p. 122). All types of researches revolve around a learning objective and that is to actually advance the level of knowledge in a certain topic. Saunders et al. (2009, p. 5) present research as "something that people undertake in order to find out things in a systematic way, thereby increasing their knowledge" [3]. This denotes that research must be established on facts, rationales and, eventually, establish verified connections between variables and not be based on assumptions. The fundamental intent of research is to construct a new logic, which has been measured and tested in order to reach a better more informed knowledge of a phenomenon leading to a better more informed decision making. Consequently, it becomes imperative for every researcher to make sure that during the research she/he undertook. Every stage of the research has gone through the rigid ethical scope to guarantee that all results or conclusions reached and recommendations written have actually been verified, not only statistically but also ethically.

1.3 What Are the Fundamental Research Ethics Principles?

– Respect for persons and informed consent; justice and respect for Communities

Zikmund et al. (2013, p. 89) elucidate that "informed consent means that the individual understands what the researcher wants him or her to do and consents to the research study" [4]. Evidently, an informed consent needs to be obtained from any and all participants in any given research, yet the scope of the consent may not be as evident. The usage of consented data is thoroughly discussed by Saunders et al. (2009), who have shown that there is a distinction between obtaining consent from research participants to provide data in a specified collection, method known to the participants at that time, and the way this consented data is then used afterwards, which might be unknown to the participants. Therefore, the extent to the consent given by participants has to be clearly defined to avoid any unethical behavior [3]. When a researcher considers that a consent seems implicit, by the simple fact that the participant has in fact agreed to answer the questions or the enquiries, the researcher would be at fault. Saunders et al. (2009) expound that what could be understood as consent in the eyes of the researcher, when participants are asked to take part in

the research through answering questions or surveys and they agree, may not necessarily mean the consent has been understood the same way by the participant [3]. A formal consent has to be obtained directly and clearly from the participant after having thoroughly explained to him/her the purpose of the research and where data might be used. Implied consent is therefore different from informed consent which denotes that the participant has in fact, and under no pressure whatsoever, agreed to participate in the research after obtaining sufficient explanations about the various aspects and magnitudes of the research [3]. As a general rule, it is advisable that any and all research undertaken must be done with the use of a documented consent form (see Sample 1), clearly signed by any and all parties involved. This includes and may not be limited to the researcher(s) and/or entity undertaking the research on one hand and the person consenting to participate in the research on the other. Details to be included in the written consent form may vary and that depends upon the type of research undertaken, the participating entity and the level of potential harm, which may be caused as a result of the research or of the later usage of the data. A written consent form becomes a necessity, especially when interviews and observations methods are primarily used in a typical research study [3]. Researchers have to be both, sensitive and sensible about certain research topics, which require respect for persons and respect for communities. Topics which are regarded as highly affective for persons and/or communities such as medical research or unemployment would certainly need to be treated delicately. Jones et al. (2014) state that communities are entities with "dignitary interests, values and rights". Therefore, communities are to be carefully pondered upon in the ethical review of any research [6].

– Non-maleficence and beneficence

Saunders et al. (2009) have summed up the substance of ethical considerations as the principle of non-maleficence [3]. To them, anyone who wishes to originate research has to abide by the principle of non-maleficence or eluding any possible harm. The principle of non-maleficence needs to be maintained from the method used by the researcher to obtain consent all the way through, till the researcher examines, uses and reports the final data or results; that includes the way confidentiality and/or anonymity is protected throughout the research phases and the methods used to obtain data from the participants [3]. The Stanford Encyclopedia of Philosophy (2013) has revised the principle of beneficence in both, theoretical and applied ethics, and has highlighted the idea that, ethically, organizations or corporations might have questionable motives to take part or allow research to take place and give access to data [7]. This notion denotes that motives such as portraying a more notorious and affectionate public image for the corporate might be the clandestine motive.

1.4 Who Oversees Research Ethics? Institutional Research Boards (IRBs)

Institutional Research Boards (IRBs) are committees established by corporations or other specialized bodies to inspect, review and then make a decision either to approve or not research proposals, especially, when research involves humans in any way or form. The principle objective of initiating such boards is to assure that the research undertaken is in full accord with the resolute ethical guidelines and any existing governing laws. Universities around the world usually have their own research boards and/or ethical committees, some universities even have Independent Ethical Committees (IECs) to assure non-biased decision and verdict. These are formed with faculty members and other academicians from outside the university to preserve the highest possible levels of objectivity and credibility. These university IECs have to examine and then approve (or disapprove) the research proposal presented. They also have a responsibility to monitor the progress of the proposed research in all its stages. IEC's main responsibility remains in examining the research through its ethical scope in the purpose of safeguarding the wellbeing of participants and or participating organizations. The IECs act as providing support for researchers through having a specialized committee that assess their work in an objective manner, analyzing any potential risks and proposing ways to minimize or mitigate such potential risks. Ethical practices are reviewed periodically to determine and identify existing or surging risks. The Academy of Management (AoM) Code of Ethical Conduct (2005) is an example of IRBs and IECs [8].

1.5 How Do We Maintain Ethics Through All Research Phases?

In each and every phase of the research, high standards of ethics and morals must be upheld. Ethical judgements must take effect from the choice of research topic, they must continue through to research results and the conclusion and recommendations. The researcher must think, act and write the entirety of the research in an ethical manner. The initial stages of every research are the foundation grounds of the research. Therefore, they are expected to provide a quality research based on current knowledge on the topic to all entities who will be affected by the research [3]. The researcher must understand that all choices decided upon the research should be guided by ethical guidelines. Subsequently, the research design and the access level, approved between all entities involved, will hold some important ethical selections. These shall be elaborated in further details in following sections. Any researcher must understand that any choices he/she may make during the course of the research must follow correct ethics. This includes all understandings, explanations, observations or interpretations made or anticipated about persons or situations noticed throughout the research.

1.6 General Ethical Issues

Undertaking and conducting research entails many ethical issues such as:

- Maintaining the participant's privacy at all times during the research and beyond
- Understanding and dealing professionally with the possibility of participants wishing to withdraw from the research at any given stage and not exercising any form of moral pressure on them to stay
- Attaining a fully completed and fully informed consent; dealing with possible participant's deception
- Guaranteeing the rights to confidentiality and anonymity to all entities involved at any and all stages of the research as agreed, circumstances causing any form of embarrassment, stress, detriment, and or uneasiness in any way or agony, whether physical or emotional
- Maintaining impartiality and detachment throughout all the stages of the research
- Keeping in mind the rights of the sponsor(s) and participant(s) to a research of quality, conveying new knowledge to existing problems [3].

2 Ethical Issues in the Scientific Research Process

2.1 Ethical Issues During Design and Gaining Access

The importance of the design stage of the research is that it lays the ground for all the subsequent stages of the research. Therefore, it is the preparatory platform for laying down the grounds of ethics, in which the entire ethical dimension of the research will be constructed. Cooper and Schindler (2006) emphasize that possible ethical complications could emerge at the design stage; yet careful planning could eliminate those. An ethically aware and "responsible" researcher, not only copes with arising ethical problems in the "design, procedures and protocols", but anticipates them demonstrating "personal integrity" [2]. Saunders et al. (2009) advise researchers that while designing the research and deciding upon the ways to conduct it, a researcher should ensure, for example, that the method and strategy, intended to be used, does not cause any form of harm to any of the entities involved in the research [3]. The authors continue, referring to Robson (2002) and Sekaran (2003) explaining that at the gaining access stage of research, the researcher ought not to impose any form of pressure or hassle to acquire the desired access [9, 10]. This ethically highly dubious action is seen as a direct "invasion of privacy" and a subsequent "coerced participation", in the case that the participation does take effect following repetitive requests from the researcher. Following the same logic, Saunders et al. (2009) revert back to Cooper and Schindler (2006), as well as Robson (2002), in accentuating that the researcher must also graciously accept that any participant could refuse to take part in the research and should not, under any circumstance, be pushed or coerced in

any mode to do so [2, 3, 9]. This right of refusal is an integral part the rights of the participant(s).

2.2 Ethical Issues During Data Collection

The data collection stage is a build-up stage for later results and concluding notes allowing the structuring of new informed knowledge. Ethical integrity becomes of utmost significance for the validity and reliability of the consequent research findings. Once the necessary access has been granted, the researcher has the responsibility to understand that all participants would still hold their rights to withdraw or refuse to take part, or release part of some information or aspects, of the research other than what was agreed upon initially [4]. Evidently, this denotes that a researcher may not as well, at any given moment of the research, decide to change the method or the nature of data collecting after the initial access has been agreed [3]. An added essential ethical concern in the data collection stage is the level of objectivity of the researcher, reflected in the method and mode in which the researcher collects the data. This is an exercise, which has to be precise and truthful so that no personal selectivity occurs whether, intentionally or unintentionally, as emphasized by Saunders et al. (2009) [3]. The authors also confer that such unethical attitude towards data collection modes may transfer negatively on the "validity and reliability" of the research [3]. Any form of ethical breach occurring at the data collection stage will inevitably replicate damagingly on the analyzing and evaluating of that data. Saunders et al. (2009) concur that no presentation of fabricated data, in any way, amount or form, is born ethically. No matter the settings, a researcher may not claim to be presenting viable results to construct an addition to present knowledge, based on partial or full assumptions of the researcher's original data collected parts [3].

2.3 Ethical Issues Associated with Data Processing and Storage

During the research data processing phase, and once data has been accessed and gathered in a flawless ethical manner, the processing and storing of the data takes place in a correspondingly ethical mode. Participants who have supplied the data for the research, whether individuals or organizations are going to connect with the method in which the data might be process and the storage method for the data to be used later on. This process renders the data personal as associated with the person who actually supplied it. This becomes especially relevant in the occasion of collecting primary data through individual or collective interviews. The obligation to protect the individuals and the groups of interviewees, presents a legislative right and is exercised in a lot of nations. Every researcher undertaking research has an ethical duty to look

deeply into the "legislative requirements" of the nation where he/she is conducting the research [3] in order to protect data, especially data of sensitive personal nature such as data about the person's ethnic backgrounds, political inclinations or even religious preferences. Saunders et al. (2009) add that every researcher has an obligation to assure that the information is "completely and genuinely anonymized" [3].

2.4 Ethical Issues Related to Analysis and Reporting

From an ethical perspective, the objectivity of the researcher at the data analysis stage of research and the presentation of the results is thoroughly discussed by Zikmund et al. as the researcher is required to uphold highest standards and not be lured to present certain personal assumptions or sustain a particular view through the alteration or misrepresentation of results [4]. This jeopardizes the researcher's integrity [3]. Statistical conclusions reached must be intrinsically accurate and the methods used must be clearly justified. Every researcher has the responsibility not to misrepresent any of the findings and show results and findings as either "under- or overstated" according to Zikmund et al. (2013) [4]. On the other hand, Saunders et al. (2009) caution about even more complicated ethical issues, which will arise when other researchers revert or rely onto the initial research results, made by the researcher or revert to his/her conclusions and then base their own decision making and conclusions upon those results or recommendations [3]. The fear that wrongful or falsified research findings—whether intentionally or unintentionally—might be used by other researchers to inform new decisions exist. This adds ethical responsibilities of multiple dimensions onto the researcher's shoulders and directly touches the people and the entities who were involved throughout the research, The information that they supplied might be affected as well as, since the way the report or publish this information might disturb them and their status at work, at present or at any alternative time in the future.

3 Ethical Consideration in Quantitative and Qualitative Research

3.1 The Basic Differences Between Quantitative and Qualitative Research

Bryman and Bell (2011) define *qualitative research* as "the approach to empirical research that relies primarily on the collection of qualitative data (i.e., nonnumeric data such as words, pictures, images)" [5]. Furthermore, Creswell (2003) argues that a "qualitative approach is one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives" [11]. Schindler and Cooper

Sample Consent Form:

A sample for an interview informed Consent Form
[Title of the Study] [Start and End date of study]

I, the undersigned, have read and understood the Study Information Sheet provided to me by the researcher and hereby confirm the following:

- I have been duly informed about all the details undertaken throughout the study, and the ultimate purpose of the study.
- I have asked the researcher all the questions I had concerning the study, the results and the later possible publication of the study and have received satisfying answers from the researcher.
- I have received ample assurance from the researcher that confidentiality and anonymity shall be maintained throughout all the stages of research.
- I understand that taking part in the study might include in part or in whole: interviews, audio recording, video recording, observation, and written reporting.
- I understand that any personal facts such as name and employer address shall not be revealed outside this study.
- I agree for my words to be quoted by the researcher in publications, reports, university website.
- I have been clearly informed that I maintain the right to withdraw from the study, and this at any stage of the study.
- I have been given ample time for deciding and I agree to take part in the study.

NAME OF PARTICIPANT: _____

DATE: _____

SIGNATURE OF PARTICIPANT: _____

SIGNATURE OF RESEARCHER: _____

Sample 1 Consent form

(2006) add that the origins of qualitative research come from a plethora of multiple disciplines encompassing anthropology, sociology, psychology, communication, economics and semiotics [2]. In qualitative research, data should be analyzed in depth and the significance of data should be truthfully interpreted. Researchers use qualitative research methods in an attempt to advance a theory based on the quality of the data collected. Two methods exist for theory advancement: the deductive and the inductive. The responses have to be grouped into categories where the relationship between variables is then constructed within those categories. Usage of qualitative research methods is recommended either when the research objective is of a less subjective nature, or when the researcher is searching for an in-depth understandings of relationships between variables or when the research aims to advance a new approach or a new theory [3]. In qualitative research, data results from a diversity and multitude of sources from individuals or experts, groups, corporations, societies, texts, as well as settings, environments, objects, artifacts, media products or even events [12].

The debate continues amongst the research community worldwide in order to know which is grander: qualitative research or quantitative research? The reality of the matter remains the following: there are no simple answers, it is highly relative. It depends heavily on the nature of the research problem, its context, the availability of data, the availability of the experts, etc. Therefore, what depicts the preference

in use of a certain research method over the other is directly reliant on the comprehensive research context. Hence, an ideal scenario for a research methodology would possibly be to combine both aspects of quantitative and qualitative research to enrich the quality and the reliability of the research. A given research project would possibly start with a qualitative research methods which leads to a more in-depth understanding of a certain phenomenon or reveal variables connected with a certain theoretical model. Once this is done, then use of quantitative research methods would trail to test the established relationships among the model's variables in an attempt to generalize findings [3].

3.2 Quantitative Research

Contrary to qualitative research, *quantitative research* aims at testing concepts through the usage of definite scales that engender numeric values. A researcher is typically able to utilize these numeric values in the aim of testing a certain hypothesis. The objective of quantitative research aims at understanding a phenomenon through the significance of the numbers obtained and their interrelationship [3]. Consequently, the quantitative research methodology is used most commonly in descriptive and causal research designs. Typically, when conducting deductive research types, the researcher instigates from an existing theory or concept already established, deducts an observable hypothesis from the latter and tests it, in an attempt to generalize it [4].

Table 1 presents a series of the main differences between quantitative and qualitative research methods. The table exhibits some of the major dissimilarities between the two methodology approaches. In it remain some valid exceptions. The approach of quantitative research relies predominantly on well designed and arranged questions to collect responses that are subsequently coded, categorized, statistically quantified and analyzed. In contrast, qualitative research utilizes a series of unstructured questions to uncover information to find new original theories. As a result, qualitative research approaches belong well in exploratory studies. Quantitative research makes easier to provide generalizable conclusions, as it relies on much larger samples where the data obtained from participants is, partially, identical. Differences between the two approaches also include the level of involvement of the researcher and the research sponsor. Understandably, the level of involvement in qualitative research is much higher to delve in depth in the research topic, whilst in quantitative research, the researcher attempts to keep distance from the participants in order to avoid any bias in research.

4 Ethics in Quantitative and Qualitative Research

In the past four decades or so, a considerable rise in ethical consideration concerning research methodologies, whether being quantitative or qualitative, has been noticed

Table 1 Distinctions between quantitative and qualitative research

Research aspect	Qualitative research	Quantitative research
Research aim	Understand and interpret phenomena	Answers a research question or tests hypotheses
Research usage	Exploratory research	
Data collection approach and methods	Unstructured questions. Usage of observation, individual or group interviews	Well-structured with categorized responses. Uses surveys, experiments and or quasi-experiments to collect data
Research approach and data analysis	Data is observed, reported and interpreted. Analysis' focus is on the contextual framework of the phenomena under study	Data is coded, categorized and analyzed. Analysis is computer assisted
Research nature	Subjectively inclined	Objectively inclined
Sample size	Relies on small samples	Large samples to provide generalization of results
Sample design	Non-probability sampling techniques	Probability sampling techniques
Researcher involvement	Active participation through direct observation or conducting interviews or focus groups	Rarely has direct contact with participant

[5]. Multiple ethical considerations are under scrutiny when choosing a research topic. Some substantial questions of ethical nature might rise when dealing with topics that are sensitive or when a specific type of research design might cause some form of embarrassment, physical or psychological harm, discomfort, sufferings or problems alike to the population under study [3].

Entities who are involved in the research process, even at differing degrees, can all be subject to ethical issues. These include the researchers—whether individuals or public bodies—who are undertaking research, the ultimate users of research, including the organization who requests the research (the client), the research sponsor and the research participants [4].

4.1 The Research Participant

As stated in previous sections, it is decisive for the researcher to pay attention to ethical considerations especially in the research design phase of the research process. It is particularly indispensable to protect the rights of the participants. According to Cooper and Schindler (2006), one good practice is to firstly explain clearly to the participant the purpose and the benefits of the study (answering the question

"What it's in there for me"), secondly clearly state to the participant their rights and protections and thirdly obtain informed consent [2]. The informed consent is granted "when an individual understands what the researcher wants him or her to do and consents to the research study" [4]. Once an informed consent has been gained, and there exits an exchange for *confidentiality*, the participants are supposed to answer the researcher truthfully and honestly. As noted earlier, a participant reserves the right to choose whether to participate or not in the research survey or interview.

It is notable to mention that some types of research might cause physical detriment as well as psychological harm to the participants. Psychological detriment could occur as a result of a certain type of research which may cause stress or discomfort to the respondents. Another ethical consideration to take into account is the fall into the deceiving trap. Deception occurs in research when the participants are told the truth only partially and not to the full extent. However, some authors have found that a form of deception is sometimes necessary for confidentiality purposes or to enforce an unbiased answer or stand from participants. Nevertheless, the American Psychological Association's code of ethics still clearly advises a researcher to avoid the use of deception, unless the deceptive approach is in fact vindicated by the study's attained values [4].

4.2 The Researcher

In research ethics, a large focus is on the researcher and his/her interaction with the public. A set codes of ethics and ethical conduct has been established by several bodies such as the American Marketing Association (AMA), the European Society for Opinion and Market Research (ESOMAR), the Marketing Research Society (MRS) and the Council of American Survey Research Organizations (CASRO). These codes of ethics aim at providing precise guidelines for both, the research participants and the researchers, in order to elucidate the rights and obligations of the researcher.

Common unethical practices that the researcher might execute are *sugging* and *frugging*. Zikmund et al. (2013) explain that *Sugging* is an attempt by the researcher to sell a product or a concept under the guise of research and that *frugging* means "fund-raising under the guise of research" [4]. Added to the above, research might be done for marketing purposes such as in *pseudo-research* or *push polls* where research is undergone and not done for its original purpose; to gather necessary information. It rather validate marketing decisions in organizations, influence public opinion or use a survey's findings by different parties to strengthen their interpretations. As an example, in quantitative research surveys and polls might be used to swindle people or even substitute votes. Consequently, conducting a survey in an ethically correct manner must avoid predisposed or loaded questions that are designed to actually lead participants to answer the questions in the form and content by the researcher. On the other hand, a survey's purpose should not be to compile material that is already available in published sources [13].

The forte element in qualitative research, and the key to conduct an effective interview, is to be able to establish a good rapport. Nevertheless, establishing a rapport could be, in many instances, a challenging practice and is often subject to even more depth ethical concerns. Duncombe and Jessop (2013) explored in their study, some of the ethical and emotional issues which could become concomitant with interviews [14]. They state that achieving rapport is more difficult when the interviewer feels no empathy with the interviewees or when he/she feels indebted to force a personal friendship with the interviewees [14]. More often, ethical dilemmas do occur in interviews, particularly when the researcher is dealing with sensitive data or subjects and eventual conflicts of interest. To guarantee that qualitative research answers will set ethical principles "Qualitative researchers should report the incidents and ethical issues encountered in their studies to ensure discussion, analysis, and prevention of future mistakes" [15].

5 Ethics and Professionalism

5.1 Integrity During Execution of the Study

It is not a secret that research is a procedure that is highly complex and extremely lengthy. It requires lucidity, accuracy and succinctness and most essential integrity and honesty throughout its various stages. Some researchers may fall into some pitfalls and these could include, and not be limited to misinterpretation of results, erroneous observations and plagiarism [16].

5.2 Integrity Related to Publishing

Presently, journals around the world are familiar with the significance of ethical research in providing honest, integral and reliable scientific research. Journals have set publishing policies and they expect researchers to follow these policies strictly at the time of publishing. The following is an example of what these publishing policies could enclose:

- Authorship statement: Authors sign this statement to declare their substantive contribution to the journal.
- Conflict of interest statement: A signed document where authors declare any existing conflicts of interest.
- Redundant Publication Statement: Authors declare that the work has not been published previously in whole or in part.
- Human/animal subjects Statement Human/animal subjects Statement: Authors declare that their article was reviewed by an Ethical Review Committee.

– Duplicate submissions: Authors declare that the work has not been published, or is not being considered for not been published, or is not being considered for publication, by another journal publication.

5.3 Simultaneous Submission

The matter of simultaneous submission remains debatable amongst scholars as to whether or not it is in fact an ethical act or not. In most instances, especially in a case where more than one journal decides to publish a paper, it is consider a violation of copyright laws. Moreover, when more than a single journal carries out the publishing process, it is seen as a waste of time and money [17].

5.4 Authorship

The authorship is one central aspect of research as it is used to recognize the individuals and or entities who are liable for the study. For this reason, and in order to accord to an individual authorship right of a research paper, the author should provide a substantial contribution to the research process. Individuals who submit the largest substantial contribution to the research should have their names listed first on the paper [18].

5.5 Plagiarism and Maintaining Integrity

Plagiarism and unfair practice constitute some of the foremost mounting problems in scientific writing, which institutes an immense challenge to academic integrity. Online plagiarism is multiplying due to the large amount of available data with easy access online. "*Cyber cheating*" has sadly become a common practice. Park (2003, p. 472) implies that "plagiarism involves literary theft, stealing (by copying) the words or ideas of someone else and passing them off as one's own without crediting the source". Plagiarism is also defined as the "borrowing of another's ideas or words without crediting the author" [19].

Park (2003) states that students' plagiarism can take many forms [20]. According to the same author, a student who is working in a group on a specific paper may use the material as his/her own. Moreover, students may submit a paper that was written by a friend or other people, with or without their knowledge, as their own. Other forms of plagiarism include students who copy material from different sources (including online sources) without acknowledging the authors and use it as their own. The act of paraphrasing a certain text without adequate citation and referencing is also considered as plagiarism [20].

Table 2 Reference list bibliographic details

Journal	Book	Website	Newspapers, magazines
Author(s) family name and initials	Author(s) family name and initials	Author(s) family name and initials	Author(s) family name and initials
Year of publication	Year of publication	Year of publication	Year of publication
Title of article	Title of article	Title of article	Title of article
Title of journal	Title of book	Publisher	Title of newspapers/magazines
Volume, issue number	Edition	Full URL and the date of access to information	Volume, issue number
Page numbers	Page numbers	Place of publication	Page numbers
DOI	ISB (if available)		

5.6 Referencing

Similarly, and to help avoid plagiarism, proper referencing is indispensable so that all material, data and statistics used in the research is acknowledged in an accurate way. This way credit can be given to the authors of the primary content and the readers can allocate the original items in case they need to do so. The reader can trace the full source citation from the list of references that follows the completed body of the paper. In some research studies, the researcher is also obliged to include a bibliography on top of the references list; yet in other research studies the completed list of references is enough. In both cases, certain bibliographic details must be shown [3]. Those details could differ depending on the referencing format adopted in the research study, yet Table 2 summarizes the bibliographic details by type of publication.

5.7 Sanctions for Breach of Integrity

The higher education institutions around the world continue to place a high value on academic integrity. These institutions are conscious that the violation of academic integrity might lead to damaging harmful effects to the institution's notoriety and reputation. Moreover, academic integrity affects to a large magnitude of the educational institution "intellectual climate". As a result, academic integrity remains a serious offense that must be handle with very strictly and appropriate sanctions. Any violation of the academic integrity standards set, in any higher education institution around the world, is seen as a very serious offence. The purpose of the sanctions are two; instructive and regulatory. Subsequently, sanctions are imposed not only to punish those individuals who violate the academic integrity but also to initiate

individuals on adopting correct standards of academic integrity in their future work. In case of academic integrity breach, a range of sanctions is in place to choose from what is appropriate as to the degree of breach. The multitude of sanctions may differ from one educational institution to the other. The list of sanctions may include but are not limited to the following [18]:

- Warning Letter
- Grades loss
- Academic probation
- Suspension
- Expulsion from the University.

6 Case Study 1.1

Case Study

A local community university faces ethical dilemma

In 2003, a newly established local university generated a campaign within its local community during the months of October and November, in an attempt to raise funds. The university's campaign included TV commercials, radio spots, and newspaper adverts.

The result was large amounts of donations mostly coming from outside the community. Towards Christmas time, the university multiplied its campaigning efforts and was able to donate over 1.3 Million dollars to a local cancer fighting charity. The event was broadcasted live nationwide and spread all over the news.

The next few weeks were rather perplex for the university. The local community press raised issues concerning the university's actions. They claimed the university had ulterior motives and was after gaining a good reputation and attracting a certain profile of students; that personal gain was attained rather than the community's. Some local papers even went to suggest that the university 'used' the cancer fighting cause to serve their own interests.

1. Do you think the actions of the university are justified ethically and these actions fall under the Corporate Social Responsibility (CSR)? Justify your answer.
2. In your view, how should the university have tackled this ethical issue to avoid its escalation? You may support your answer by giving examples of a similar situation.

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Thinking Out of the Box. Non-typical Research Methods in Business

Kinaz Al Aytouni and Kinan M. Naddeh

1 Thinking Outside the Box

The definition of research includes thinking in a creative way and from new angle or perspective to find innovative solutions for unsolved problems or to push to overcome business obstacles that impede decision-making process. Thinking differently in unconventional style called "Thinking outside the box".

In the next pages, the authors will try to use the Five W's and one H (5 W's and 1 H) to discuss the topic of this chapter.

1.1 What Does "Thinking Outside the Box" Mean?

As research comprises creative and systematic work, it is about bringing new increment to the stock of knowledge, devise new applications, establish new ideas, discover new facts, develop new theories, new problems or solutions existed but never known before; it is not just to handle current problems, but also bring new pillars to new theories.

All those initiatives require hard, deep and thorough work as well as lateral thinking with different style, tools, and non-typical methods.

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Using lateral thinking for problem solving means using indirect creative approaches, reasoning that is not immediately obvious and that involves ideas that may not be obtained directly through traditional techniques [1].

"Thinking outside the box" is a phrase thought to be derived from management consultants who confronted problems that need lateral thinking [2].

However, thinking out-of-the box requires passion for discovery, intellectual challenge and restatement of the solution strategy for research problems. Sometimes, for a researcher, perceived barriers may prevent him from discovering a solution. He might need to breakthrough barriers to find an output.

This new way of thinking has relation with the kind of knowledge (procedural or declarative) that the researcher follows. Experiments tasks can be exercised with procedural knowledge. When a researcher's thinking is dominated by exercising procedural knowledge, while he is performing special tasks or procedures, it could be induced that he is trying to discover solutions or removing errors by doing and redoing (trial and error) [3].

Finding solutions by trial and error is good as long as there is ample of time and research budget and the researcher learn from his faults, but if not, there is a need to overcome time and cost limitations.

Another limitation of procedural knowledge is its job-dependence; that particular knowledge may have only a commercial value for a specific consumer or job-shop. Nonetheless researcher can get advantages of procedural knowledge as it may improve the ability to learn and add new elements or controls to the experiment as well as undergo an innovative problem solving. Grasping the pros and cons of proposed solutions [3] is also good and may lead to eclipse theories by practice.

On the other hand, declarative (descriptive or propositional) knowledge "*distinguish itself from what is known as 'know-how' or the procedural knowledge* (*i.e. the knowledge of how*, *and especially how best*, *to perform some task*) *and 'knowing of' or knowledge by acquaintance* (*the knowledge of something existence*)" [4]. The researcher may try to think out loud, freely and non-judgmentally, using propositional knowledge to get new ideas out of the box, which allow him to solve problems.

The purpose of this extended explanation of the two kinds of knowledge is to draw attention to the importance of scrutinizing facts and data with other methods and tools. Trying to solve obstinate research problems by do and redo or impart from one's own experiment without a scientific method may take the researcher to another problem of a situated knowledge. For example, "imagine two very similar breeds of mushroom, which grow on either side of a mountain, one nutritious, one poisonous. Relying on knowledge from one side of an ecological boundary, after crossing to the other, may lead to starving rather than eating perfectly healthy food near at hand or to poisoning oneself by mistake. The scientific method tries to overcome such a mistake. Theories generated by a scientific method are much less situational" [4].

However, there is something that the researcher must keep in mind; not all problems are well defined, have tailored objectives or have all required inputs to handle the problem provided. Furthermore, problems, that are precisely defined, have a clear

solution. The solution is "outside of the box" and may be difficult to find at first. Once it is found it can be clarified.

Researchers encountered ill-defined problems. Those problems are characterized by:

– Not having a clear question.
– Not having a clue for solution.
– Having no idea what the solution looks like [2].

Solving such vague problems in the world of business may need further collaboration of many typical and non-typical methods of business research.

1.2 What Is Inside the Box?

> If you think of the entire universe as a box, many people would tell you there is nothing outside of that box. Sometimes they are called materialists. [5]

The existence of a box means there are limitations, constrains and measures, such as budget, organizational, experimental or environmental constraints. Navigating beyond the restrictive borders of the box can be positive because it foster creative leaps, like generating innovative ideas, or negative, which penetrates deep into the "bottom of the box" [2].

In the professional environment, creative leaders push their thinking, passionately, to the positive-light-side out of the box, while poor leadership amplitudes leads to be inside of the "box". This might be led by negative amplitudes.

However, the process of contemplating-in-the-box needs to be constructed in a negative context. Such type of thinking is important to set stable foundations of cumulative knowledge to build upon.

In leadership, for example, scrutinizing to the bottom of the box should lead to clarify and Breakthrough Opportunity Areas (BOAs), identify risks, learn from previous mistakes and apply best practices. In other words, the researcher might be in a better position. This can be emphasize in a multi-stage design thinking process.

1.3 How to Capture Innovative Thinking Outside the Box in a Systematic Way? Teoriya Resheniya Izobreatatelskikh Zadatch (TRIZ)

One of the best systematic ways to move to think outside the box with a non-typical method in the domain of business research is "TRIZ".

TRIZ was first introduced in the theorem and application to tackle the so-called "non-ordinary" issues. Such issues are innovative (or inventive) problems, which cannot be solved with classical methods and that may need non-typical methods for

problems solving (new beyond ordinary solutions). TRIZ extracts common solution patterns that exist in a previous solution, patents, inventions or studies.

During the last two decades, TRIZ developers extended its implementation to the field of business. Plausibly, many complicated issues in business find its way to be untied efficiently and effectively. An evolving process ended with a further promotion of "Business TRIZ"—around 2003. It was then applied to six sigma and quality management between 2004 and 2008 [6]. TRIZ applies the concept of evolution through contradiction resolution. When a certain current business model becomes obsolete, facing contradictions and not able to survive because of changes in the surrounding environment, TRIZ works to provide strategies and patterns for solving contradictions in time and space. Sometimes the solution could be compromised/optimized or radically improved. One generic way, is to consider the opposite action instead of an intended one (Cf. [7], p. 5).

An important advantage of using TRIZ is helping transfer a weekly-defined contradiction that need to be tackled into a solution by solving an inventive task at an abstract level; to minimize the search space to the most related world's conceptual solutions. With this method, the researcher can use the advanced knowledge of his precedents, of inventive solution or patterns, to save time and efforts (Cf. [7], p. 3). This is need in any deliberated transitional process.

In general, there are two ways to approach a problem: to apply optimization or to trade-off among alternatives. Optimal solutions may help, but not always. In this case, there is a non-systematic lateral thinking way to solve a problem by continuing using brainstorming, which is still completely based on unclear trial and error. However, brainstorming works very well for relatively simple business research problems. On the other hand, for complicated and sophisticated matters, the researcher might not be sure after bad trails. He/she is going to achieve a desired result, so maybe it is better to break through thinking with TRIZ (Cf. [7], p. 6).

2 Non-typical Method for Business Researches

Why non-typical methods? While, unnoticed historical data exists, where there is large number of variables and the volumes of data rise dramatically, a new type of methods, which have the capability to handle this nature of large data, is needed for extracting knowledge from it and to support researchers in solving a problem or finding an opportunity [8].

Artificial intelligence (AI) is about intelligent problem solving, by using AI data that can be transformed into knowledge. It can adapt to any environment and manage incomplete or incorrect knowledge. The main area within AI is machine learning. It emphasizes in building knowledge for future use [9]. Data mining is the practical aspect of machine learning. Fayyad (1996) defines DM as the "nontrivial process of identifying valid, novel, potentially useful and ultimately understandable patterns in data" [8]. The general approach used in the data-mining arena is to use historical values to learn from past observations, extract knowledge and test it with new values.

It is very close to statistics but there are important differences between them. The important aspect that differentiates data mining is the secondary data analysis, which has been collected for some other purpose to answer a particular data analytical issue [10]. Data mining approaches underline database integration, a simplicity of use, besides the issue of computational feasibility, which has a greater role in data mining than in statistics [11]. Artificial neural network, genetic algorithm, decision trees, nearest neighbours and rule induction are data mining tools. Our focus in this chapter will be on Artificial Neural Network (ANN).

Neural networks have developed as advanced data mining tools in such cases where other AI techniques may not produce adequate predictive models. They have been successfully executed in fields ranging from engineering to space exploration and many others [12]. From business perspective, they are used as data analytic methods. Neural networks and genetic algorithms are at the "*lowest levels of AI abstraction*" [9]. The principle of ANN is learning knowledge, which is implicit in the data as a property of patterns of relationships, while other techniques are representing knowledge in explicit logical sentences.

3 Artificial Neural Networks

Kevin Gurney (1997) defines a neural network as "*an interconnected assembly of simple processing elements, units or nodes, whose functionality is loosely based on the animal neuron. The processing ability of the network is stored in the interunit connection strengths, or weights, obtained by a process of adaption to or learning from a set of training patterns*" [13].

In this section, we are going to provide background of artificial neural network and its main elements, which are known as network architecture as well as learning algorithm and parameter settings, the motivation to use them and the applications that follows.

3.1 What Is Artificial Neural Network?

Imitating human reasoning processes such as massive parallelism, capability of learning, adaptation and many other functions have motivated artificial neural networks concept [14].

In 1943, McCulloch and Pitts (1990) lay out the first step toward the concept of artificial neural networks by explaining how neurons might work, suggesting machines that are something like brains, which implement arithmetic and logical functions [15]. They modelled a simple artificial neuron with electrical circuits while Minsky and Papert's (1972) work shows that simple neuron has limitations and could not "learn" [16].

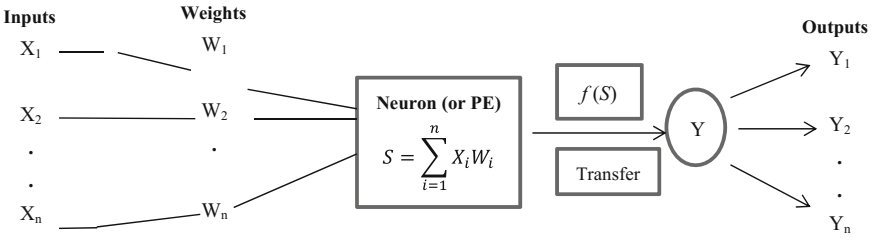


Fig. 1 Basic elements of a neuron (Developed by the Authors)

3.1.1 The Perceptron

Rosenblatt (1958) proposed a neural network structure and called it perceptron, which has weight, summation function, activation function, error function and learning components [17]. Figure 1 shows that each neuron should receive an input vector, which is named an input pattern $x = (x_1, x_2 \ldots x_n)$, and are weighed according to the weight vector of that perceptron $w = (w_1, w_2 \ldots w_n)$. The weight is the first component factor in the neuron. It gives the input pattern the impact factor that is needed on the processing computation element.

The second component is the summation units, which is typically the sum product of the input pattern multiplied by their weights (1). Then the output of the summation function, which is a single value, is fed into some activation function (2). The activation function is the third component and is binary threshold, it converts the summation function value into one single output value; it is generally between zero and one [12].

$$S = \sum_{i=1}^{n} xi * wi \tag{1}$$

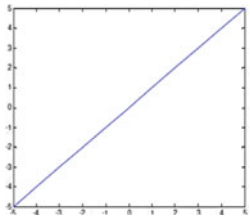
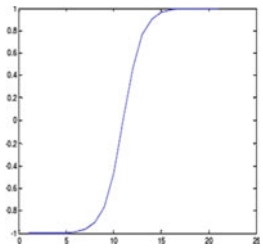
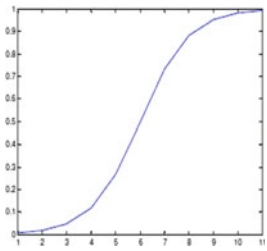
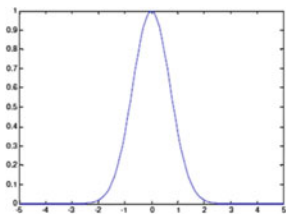
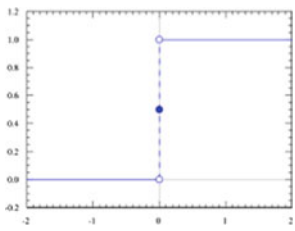
$$Y = f(S) \tag{2}$$

Activation functions could be linear or non-linear. Sarle (1994) in his paper provides an equivalent of simple linear perceptron in the form of statistical model as *multivariate multiple linear regression*, while simple nonlinear perceptron as *logistic regression* [18]. Comparing with regression models, Neural network models could be provide highly accurate results (Cf. [19], p. 1012).

The graphical illustration and mathematical form of some popular activation functions that are used in neural networks are shown in Table 1.

Learning function is one of the most important components of perceptron. ANN learns by adjusting the weight values to reach to the desired output. Measure difference between the actual and the desired output and then transformed it by the error function component to match particular network architecture. Finally, ANN generates a new model, which can be used with new data set.

Table 1 Activation function, its mathematical equation and graphical presentations for a neuron

Activation function	Mathematical equation	Graphical representation
Linear	$y = f(x)$	
Hyperbolic tan	$f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$	
Sigmoid	$f(x)\ \frac{1}{1+e^{x-1}}$	
Gaussian	$f(x) = e^{-x^{2/2}}$	
Threshold	$f(x) = 1\, if\, (x \geq 0)$ $else 0$	

As we seen above, perceptron has computational, statistical and cognitive aspects. It has a statistical aspect due to the computing unit with threshold that is look alike multiple linear regressions. While perceptron feeds the output of a multiple linear regression into an activation function, which could be non-linear; a cognitive aspect of the perceptron is presented by its learning function.

Perceptron with no hidden layers is a simple linear model and the learning function is only possible to classify linear separable patterns [16]. Therefore, the lack of implementing some Boolean functions such as exclusive-or (XOR)[1] by a single layer neural network model and the limited learning function were the cause for the researchers to modernize the perceptron model to be able to learn such functions, by the addition of several layer(s) of neurons with nonlinear transfer functions [12]. The most public ANN model contains one input layer, one or more hidden layers and an output layer [12].

3.1.2 Artificial Neural Network Architecture

As mentioned in the last section neural networks consist of a set of neurons which are interrelated through a set of weights that permits signals to navigate via the network in parallel, in the sense that all the neurons within the collection, process their inputs simultaneously and independently [9].

Neurons within neural network are organized according to a specific architecture (network topology) that can be categorized into two major groups: feed-forward and recurrent networks (feed-backward). In feed-forward network, the network connections do not shape any loops and the signal is travelled precisely in one direction from one layer to another, while one or more loops may exist in the recurrent networks. We are going to explain two models MLP, which represent feed-forward architecture, and Hopfield networks, which represent feed-backward architecture.

Multilayer Perceptron Networks (MLP)

The most usually used family of feed-forward networks is multilayer perceptron network (MLP), which is a group of nonlinear neurons structured and linked to each other in a feed forward multi-layer structure as shown in Fig. 2. These models have the potential in classification and forecasting problems [22]. Furthermore, they can be used to approximate almost any function with a high degree of accuracy [23]. It is equivalent to multivariate multiple nonlinear regression [18]. MLP consists of three types of layers, input layer that receives input patterns, hidden layer(s), and the output layer, which contains a list of classifications. The function of the hidden layers is to adjust the weightings on the inputs until the error of the neural network is minimized and those input patterns may map to only one class [24].

[1] **Exclusive OR' (XOR)**: means (either A or B but not both). In neural networks, it is a classification problem. Where A and B are groups, and x_1, x_2 are explanatory variables. When both x_1 and x_2 are either large (1, 1) or small (0, 0), the resulting group is B (0). When the same variables go in opposite directions (0, 1) or (1, 0), the group is A (1). [20, p. 106, 21].

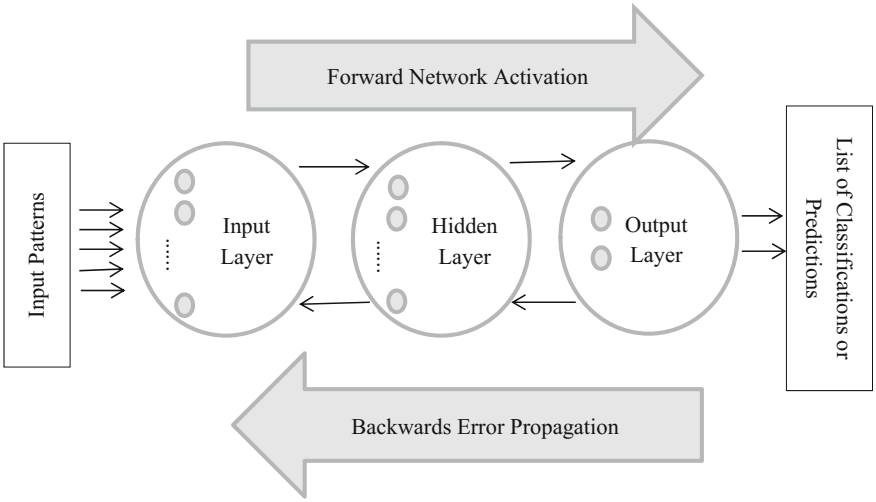


Fig. 2 MLP feed-forward network (Adapted from G. F. Luger 2005) [9]

Each neuron in the input layer acts as buffer for allocating the input signal $x_i = (x_1, x_2, \ldots x_n)$, the input signals xi are weighting with the strengths of the individual connections wji and then sums up the output by the neuron in the hidden layer, and computes its output yj as a function of the sum (3). In a similar way and through a sigmoid function the actual output of the output layer' neurons is computed (4).

$$y_i = f\left(\sum_{i=1}^{n} w_{ji} * x_i\right) \tag{3}$$

$$y(i) = \frac{1}{1 + e^{-\sum_{i=1}^{n} w_{ij} * x_i - \theta_j}} \tag{4}$$

Shack states that the MLP's key strength lies in its ability to model simple parametric problems to a highly flexible, nonparametric one.

Hopfield Networks

In Fig. 3, all nodes in the neural network are connected to each other and functions both as input and output node, this type of neural network is Hopfield network. Each node has a stored value in addition to instantaneous inputs and outputs. The net is adjusted using some known patterns to reach a stable state. As nodes fire, these values change. Then, the network task is to receive an input which is unclassified pattern and produce the known pattern as learnt output. That means the network meets a solution. The nature of the problem to be solved is embedded in the structure of the network rather than in definitions of its inputs and in its weights.

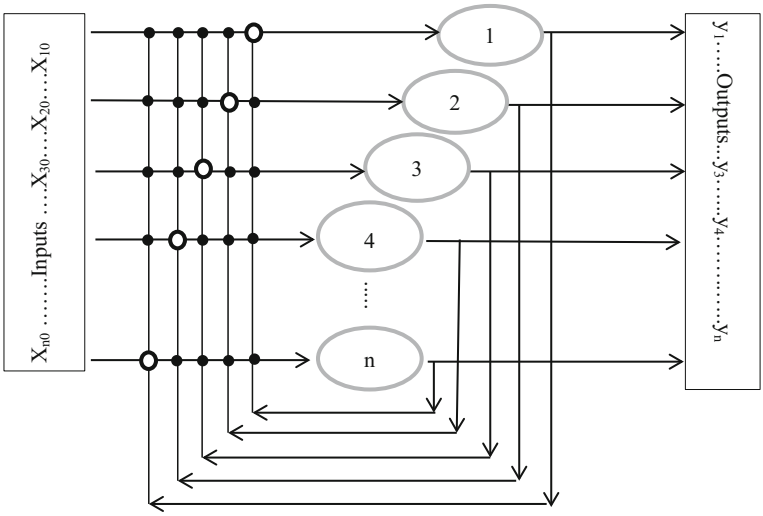


Fig. 3 Hopfield network (Adapted from E. Turban 2007) [22]

3.1.3 Artificial Neural Network Learning Algorithm

Once the network has been constructed for a specific application, then it is ready to be trained. In the context of ANN, updating network architecture and connection weights shape the learning process, so the learning process efficiently performs a specific task [24].

The main types of learning paradigm are [25]:

1. Supervised learning: In supervised training, both inputs and outputs are provided. The output computed by the network and then the actual outputs are compared to the desired ones. The resulted errors are spread back through the system, the weights will be adjusted by the system, which are controlling the network. The learning process is inductive.
2. Unsupervised learning: In unsupervised training, the inputs are only provided, while the outputs are unknown. Similar to the training history, the network is self-organized in which it detects characteristics of the data step-by-step, leads to identify the classes and the boundaries between them. Weights and other parameters can be adjusted once human examines the outputs.

The rate at which ANNs learn depends on several factors such as network complexity, architecture, size, paradigm selection, and type of learning rule [26]. A low learning rate may result in a slow learning process, but a high learning rate can lead to variability of the learning process.

Additional parameter called momentum is created to balance the learning rate [22].

In this paper we are going to present the most popular supervised learning algorithm; Back-propagation learning and it is executed in nearly all commercial ANN software packages. While for unsupervised learning, we are going to present Self-organizing map algorithm. Supervised learning is used for classification, while unsupervised learning process is used for clustering.

Back-Propagation Neural Network (BPNN)

The principle of BPNN is to propagate the output errors back to preceding layers where they are used to change the weights in the network.

As a starting point of a training process, an ANN does not contain any explicit information. A large number of cases with known outputs are provided to the system. Inputs are the independent variables, training values are the dependent variables, and the predicted values are the output value [18]. The training algorithm changed the weights of the inter-neuronal connections to decrease the total error of the system. A trained network has educed rules, which are represented by the matrix of the weights between the neurons. This feature is called generalization and allows the ANN to predict cases that have never been seen by the system before. BPNN is a powerful tool for samples with long periods [27], for function approximation [28] and its greatest power is in non-linear solutions, to ill-defined problems [26].

BPNN is more suitable for samples with long periods [27].

The BPNN learning algorithm step by step:

1. Assign weights with random values.
2. Read in the inputs (x_i) and the desired outputs (y_{target}).
3. Select an appropriate error function E(w) and learning rate η.
4. For each observation [training pattern (x_i, y_{target})]:

   4.1 Compute the current output for each neuron in the hidden layer: $y = f(s)$ where S is the output of neuron j as $s = f(\sum_{i=1}^{n} wij * xi, \theta j)$ where θj is the threshold value for the neuron j, xi is the input for the neuron i.

   4.2 Compute the error by using delta rule $\alpha = z - y$ where z is the desired output.

   4.3 Use the error to update the weights as follows:

   4.4 Gives the change Δwij the weight of a connection between neuron i and j the weight, and update equation $\Delta wij = -\eta \frac{\partial E(w)}{\partial W}$ for each weight w_{ij} in the training pattern p.

5. While the weights are unstable repeat the forth step, then activate.

Kohonen Network

Also known as, self-organizing map (SOM), its structure consists of one single layer of neurons organized in rows and columns, each one of the neuron is fully associated to all the neurons in the input layer. The structure is planned to change as part of its learning process, while the structure of an MLP network is stable by its designer. Unsupervised competitive learning constructs binary features, which represents a cluster of the observations.

The SOM learning algorithm step by step:

1. Assign small random values for the initial weights.
2. Read in the inputs (x_i).
3. Calculate the distance of the input to the weights of each neuron j.
4. The neuron with minimum value of distance $d_j(x) = \sum_{i=0}^{n} (x_i - w_{ij})^2$ often called the winner neuron.

Gives the change Δwij the weight of a connection between neuron i and j the weight, and update equation $\Delta wij = \eta(t)fun(t)(x_i - w_{ij})$ where fun(t) is the Gaussian neighborhood and $\eta(t)$ is the learning rate.

5. Repeat from step two until the weights have stabilized.

3.1.4 Parameters Selection

Nevertheless, to define a solution for a given problem, ANNs require the establishment of a set of system parameters, some of these parameters are to determine the architecture of the ANN. These parameters are the number of input neurons, the required number of output neurons, the number of hidden neurons and hidden layers, the types of activation functions, the value of the learning rate and the amount of training [29]. There is no clear algorithm on selection of those parameters. Which means to determine the appropriate architecture is a critical decision, so different models may produce different results. The reasons why these parameters are important is because if the training data is over-fitted/under-fitted by the training network the network suffers from poor generalization capability, which compromises the performance with new data. Over-fit means the network shape itself to match the training set, instead of creating a generalized model. A rule of thumb of network design is following these steps: first select a preliminary structure of one hidden layer with the number of hidden neurons equal to half the sum of the number of input and output neurons, and conduct a number of tests with each configuration iteratively. Then, if under-fitting/over-fitting occurs adding/removing more neurons to the hidden layers or adding/removing extra hidden layers, until determining an effective structure for the network [30]. These "designer's choices" for a network architecture establish the inductive bias of the system [9].

3.2 Who Will Use Artificial Neural Network?

– Researcher uses ANN methodology when his/her objective is to recognize patterns within the data that are dynamic and they use them to predict upcoming events such as fluctuation of the foreign exchange market like the case of Citibank London [30].

– When researcher's objective is to classify unseen input patterns into pre-defined groups, ANN decide the category to which an input value belongs [22] in order to classify problems into binary decision or to find the best organization of constraints and noise filtering [31].
– When researcher seeks for solutions to complex problems, which have not been solved by traditional methods due to the lack of good theoretical deductions about the underlying problems.
– When researcher needs to predict an output variable whose values are of numeric, or needs to estimate the numerical value of the desired output. When the researcher needs to cluster the data based on the similar characteristics in the data.

3.3 Why to Use Artificial Neural Network Technique for Data Analysis?

An ANN technique is applied when the data is rich and the knowledge is poor. In his paper, Zhang (1998) characterizes ANNs as "*data-driven self-adaptive methods in that there are few* a priori *assumptions about the models for problems under study*" [32]. ANN uses the rich data to learn and then a network of computing units organizes itself to implement the desired behaviour [25].

ANN has the capability of generalizing. That is, from the given pool of representative cases. ANNs seem to learn the basic rules of input-output interactions and then compare the unknown inputs to the known ones, predict cases that have never been seen by the system before [24, 27].

The parallel processing style of ANN allows for great advantages in data analysis over standard statistical approaches. They are used broadly in several branches of engineering and science and they have the ability to model complex linear, non-linear and nonparametric systems without any implicit assumptions. Compared to typical methods, all traditional techniques should have theoretical and statistical assumptions, for example assumptions about the form of population distribution, which must be met before the analysis can progress [33, 34].

ANNs have associative ability. That means, after developed, it is robust to miss incomplete or inaccurate data [19, 35].

When using large sample sizes where there is a large number of values for each case, the data does not meet distributional properties that are required by parametric statistical methods and the underlying associations among the data are fuzzy and ill defined. ANN becomes a useful approach [36].

ANN also has excellent fault tolerance and is fast and highly scalable with parallel processing. If one tries to control all of the possible variables and potential outcomes in the systems and justification for all their dynamic interactions, such a model is impractical to handle and difficult to build. ANN is then the solution [35].

The following table gives examples for some domains where was ANN applied by authors in their studies (Table 2):

Table 2 Example domains applied ANN for different problems

Serial	Domain	Problem type	Reference
Forecasting			
		Stock markets index	[37–40]
		Stock prices	[41–44]
		Forecasting foreign exchange rate	[45–48]
		Sales forecasting	[26]
		Earning forecasting	[50]
		Forecasting GDP growth	[49]
		Cash demand forecasting for ATM	[51]
		Macroeconomic forecasting	[53]
		Forecast the end-of-year Net Asset Value (NAV) of mutual funds	[37]
Finance			
		Financial engineering	[52, 55]
		Loan decisions	[54]
		Business failure and corporate distress prediction	[56, 57]
		Financial time series	[41, 58]
		Intelligent systems for finance	[59]
		Predicting bankruptcy	[60, 61]
		Bond rating	[62]
		Predicting international joint ventures performance	[63]
Accounting and auditing			
		Auditing and risk assessment	[36]
		Fraudulent financial statements	[64]
		Auditor selection	[65]
		Empirical research in accounting	[20]
Marketing			
		International tourism marketing	[66]
		Consumer service recovery	[67]
		Customer segmentation (online auction)	[68, 69]
		Brand choice	[70]
		Marketing MIX	[71]
Management and business			
		Traffic flow management	[72]
		Business model	[73]
		Targeting business users	[74]
		Social intelligence and the biology of leadership	[75]
		Students' academic performance	[76]

(continued)

Table 2 (continued)

Serial	Domain	Problem type	Reference
		Organizational research	[77]
		Operation management/manufacturing performance	[78]
		Public sector management/measuring efficiency	[79]
		E-commerce, E-business	[80]
		Optimization (Minimum cost, maximum profit subject to certain constraints)	[81]
Econometrics			
		Econometric analysis	[82]

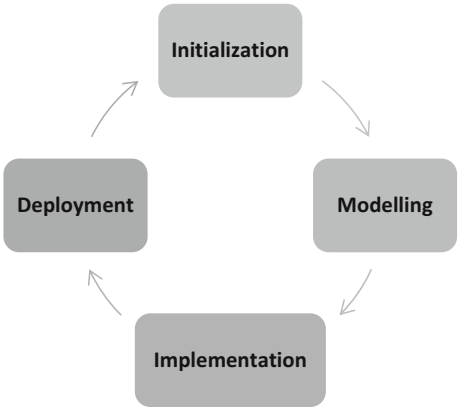


Fig. 4 A sample neural network project

For more detailed list, H. Hakimpoor listed about 30 different families of ANN that authors applied in business research and problem solving. He reported 20 problem types in marketing and sales area, 14 types in finance and accounting area, 8 types in manufacturing and production, and 3 in strategic management and business policy.

3.4 How to Use Artificial Neural Network

The researcher should follow systemic procedures to design ANN models. In general, he/she follows a four-phase model building perspective as shown in Fig. 4: (1) Initialization, (2) Modelling, (3) Implementation and (4) Deployment.

Phase 1: The most critical phase in building good systems. In this phase two activities should be done:

– Collecting data
– Preparing sample data.

The collected data could be primary or secondary one. It must include all the attributes and the information that are useful and can characterize the problem. Pre-preparing data includes two steps: convert the input data to a numerical form, so they can be discrete values {0, 1} or real-valued numbers. The second step is to form data as a pattern of input data with the desired outcome. The collected data is split randomly in two parts, 80% of the data is selected as training data and 20% as testing data. The set of data, which enables the training, is called the "*training set*". While the set of data, which enables the validating, is called the "*test set*". Validation set is used for two purpose: (1) to test the capability of the model to predict and (2) to know when to stop ANN training. An adequately sized data set should be provided to both trainings. The network and the samples need to be test and they also should be balanced [22].

Phase 2: Model selection and training is still an art, not a science [32].

In this stage three activities should be done: create the structure of the network, choose a learning algorithm and set parameters with values. Least-squares regression is solved analytically and directly. On the other hand, to create ANN, neural network architecture, training algorithms and other parameters, it must be determined through experimentation. The artifact of this phase is an optimal structure with the appropriate number of hidden-layer nodes. However, by following a well methodological approach to network design, one can be confident that a good model configuration can be found [19].

Phase 3: In this stage, building the network requires initialize weights, convert the data to network inputs, start training and test the performance of the model, until arriving to generalization capability. Learning is done by training set and evaluating the performance by test set. To settle ANN at the global minimum solution, it should be trained long enough. Normally, a sample of larger size would lead to high accuracy, whereas a smaller sample would lead to low accuracy.

Phase 4: Deployment is to use the network with new cases.

To illustrate how to develop ANN based system, Box-office prediction problem is an example of MLP ANN, the type of the research is classification model used quantitative methodology.

Initialization:

1. Collecting Data: the researchers used 2632 movies released between 1998 and 2006, which were drawn from public and commercial movie database.
2. Pre-preparing Data: The dependent variable is the box-office gross revenues. The researchers discretized the dependent variable into nine classes based on the knowledge from several industry experts in Hollywood from a "flop" to a "blockbuster. The independent variables were taken from previous literature and they are assigned to the input neurons. They are nine inputs; X1: the rating given by the Motion Picture Association of America (MPAA), which has five possible values (G, PG, PG-13, R, NR.). X2: the competition. X3: the existence of any superstars. X4: the level of technical content and special effects. X2, X3 and X4 all of them have three levels (High, Medium, and Low). X5: the number of screens on which the movie will be shown during its initial launch, which

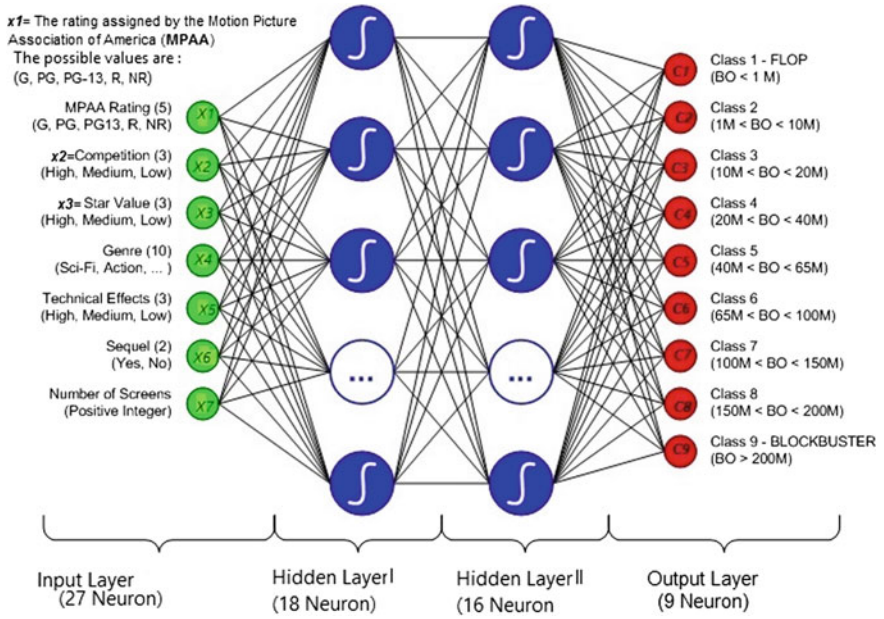


Fig. 5 Box office ANN architecture (Adapted from Sharda and Delen 2006) [83]

has an integer value. X6: the content category on which the movie belongs to. It is classified into ten categories (Sci-Fi, cartoon, action, historic epic drama, modern drama, politically related, thriller, horror, comedy, and documentary). X7: identifies if a movie is a sequel or not.

Modeling:

1. Identify network structure: An MLP architecture in Fig. 5 is selected with four layers, one input and one output layer, and two hidden layers.
   The independent variable is transformed into a 1-of-N binary representation, such as: the level of technical content and special effects, which has three representation variables (low-medium-high). The sum of all the representation variables of the independent variables is 27, which constitute the number of the neurons in the input layer. The dependent variable, that is discretized into nine classes, is represented by nine neurons in the output layer. Eighteen and sixteen neurons are assigned to the two hidden layers, respectively.
2. Select a learning algorithm: a back propagation neural network is used to train the network.
3. Set parameters and values: initial parameters and values are assigned to the network.

Implementation:

Initialize weights and start training. During the training process, an expected outcome is generated for each case. The network gradually is changing and adjusting the weights for all the interrelationships between the neurons after each incorrect prediction, until the ANN recognizes the patterns and learns how to classify it. The network through much iteration generates this information.

Deployment:

Use the network in new cases. Sharda and Delen (2006), (2010) show that ANN "*can predict the success category of a motion picture before its theatrical release with pinpoint accuracy (i.e. Bingo) with 36.9% and within one category with 75.2% accuracy*" [83, 84].

3.5 Where to Use

Artificial Neural Networks (as a non-typical method) used as a research method with output, input, ANN architecture, software used and comparable findings with other statistical methods in different domains (Table 3):

3.6 Discussion

ANN and statistics can be utilized for data analysis methods to find solutions for business problems. Even if ANN methods often perform quite well, there are still many difficulties in applying them [86].

Musso et al. (2013) claimed that ANN is very effective approach "*under conditions of very complex and great amount of data, in which a large number of variables interact in various complex and not very well understood patterns*", and it has a greater accuracy over traditional methods [87]. This effective approach can work with noisy and incomplete data [35]. Meanwhile, Edelsbrunner et al. (2013) characterized ANN as "black boxes", which obstruct testing theories systematically and the dissemination of results [88].

An important question has arisen: "should ANN replace statistical approach or not?" Many researchers have argued that it is not necessary to trade-off between artificial NNs and statistical methods [18]. Concerning the theoretical point of view, both of them are driven from different philosophies. The ANN model is defined by its architecture and learning algorithm, while the statistical model is based on testing theories, that rely on formula and computations. Sarle (1994) claims to understand the process under study [18]. Statisticians depend on human intelligence and they need longer time to define a research question. From our point of view, researchers in ANN also need to spend time to get pre knowledge about the domain under study

Table 3 Neural networks used as a research method with output, input, ANN architecture, software used and comparable findings with other statistical methods in different domains

Authors	Output variable	Number of input variables	Learning sample size per input variable	Testing sample size per input variable	Description of input variables	NN architecture, other AI/ES methods, and statistical method	Software	Summary of findings compared to statistical methods	Domain
Yim and Mitchell (2005) [56]	Binary (classify)	For the NNs only 4 input variables: returns on capital employed, assets turnover, solvency and gearing	NA	NA	22 ratios usually used in the fundamental analysis. These variables are classified in four standard ratios categories, solvency, profitability, liquidity, asset utilization, and structure. Final three variables selected by DA: returns on capital employed, solvency and gearing	ANN-Logit-PDA is a hybrid ANN that used a logit model to preselect the variables and has the Probability from a Discriminant Analysis (DA) model as an additional input. The hybrid ANNs were trained using the back-propagation algorithm, one hidden layer with/6/neurons. Learning rate = 0.5	Eviews 4.0 for statistical models and Neuroshell 2 for NNs	The results suggest that hybrid neural networks outperform all other conventional NNs and traditional statistical techniques models (logit models and discriminant analysis) in predicting firms in financial distress one year prior to the event	firm failures
Stastny et al. (2011) [85]	(classify)	10	NA	NA	30 questions on consumer behavior in areas of quality, price, origin of the product, characteristics of respondents, as age, gender, education, household type	Multi-layer (3 layers) Perceptron neural network with Back-propagation algorithm compared to Self-organizing (Kohonen's) maps	software tool Weka 3.7; MATLAB, Neural Network toolbox	Self-organizing (Kohonen's) maps brought relatively satisfactory results especially for the age variable characteristics better than MLP NN	marketing (consumer behaviour) research data classification

(continued)

Table 3 (continued)

Authors	Output variable	Number of input variables	Learning sample size per input variable	Testing sample size per input variable	Description of input variables	NN architecture, other AI/ES methods, and statistical method	Software	Summary of findings compared to statistical methods	Domain
Chen et al. 2013 [80]	Binary (classify)	26 input questions with total sample of 200 questionnaire				Three e-business service satisfaction detection models are constructed: Fruit Fly Optimization Algorithm optimized Grey Model Neural Network (FOAGMNN), Grey Model Neural Network (GMNN) with 4 layers, and Multiple Regression (MR)			satisfaction of logistics service
Vaisla et al. 2010 [37]	forecasted daily stock return	500 observations. Exchange rate, FII purchase, FII sales are input variables	NA	NA	NA	NA	Neural Ware, Neural Works Predict	NNs show superior performance in stock market forecasting than statistical multi-regression model	Stock markets forecasting
Chung et al.	Predict new case					conjugate gradient with Multiple linear regression (MLR) weight initialization			
Yang et al. (1999)	Binary (classify)		NA	NA		The authors used both a BPNN and probabilistic NNs, and compared their performance with that of discriminant analysis		Discriminant analysis more accurately predicted the status of bankrupt oil and gas companies than either a probabilistic NN model or a BPNN model	Bankruptcy

(continued)

Table 3 (continued)

Authors	Output variable	Number of input variables	Learning sample size per input variable	Testing sample size per input variable	Description of input variables	NN architecture, other AI/ES methods, and statistical method	Software	Summary of findings compared to statistical methods	Domain
Barnive et al. (1997)	Acquired, emerging, and liquidated (segmentation)		NA	NA		The authors used a BPNN		NNs performed better than logit and discriminant analysis on the training sample and full sample, but performed no better on the test sample	Bankruptcy
Bell (1997)	Binary (classify)							NNs did not perform significantly better than logit model	bankruptcy
Etheridge and Sriram (1997)	Binary (classify)		NA	NA		Initially, the authors used five NN paradigms to recognize two best performing NN paradigms. The two NN paradigms were categorical learning/instar and probabilistic NN. The authors in the study observed categorical learning network to improve NN performance the most when its output processing elements were modified with the instar learning laws. The heart of the categorical learning NN is a Kohonen (middle) layer. This Kohonen layer is self-organizing and can be used in classification task	NeuralWorks Professional II/Plus	Discriminant analysis performed better than NNs 1 year ahead of bankruptcy. A naïve model performed better than NNs 2 and 3 years ahead of bankruptcy	Bankruptcy

(continued)

Table 3 (continued)

Authors	Output variable	Number of input variables	Learning sample size per input variable	Testing sample size per input variable	Description of input variables	NN architecture, other AI/ES methods, and statistical method	Software	Summary of findings compared to statistical methods	Domain
Tan (1996)	Binary (classify)	13	111.46	53.46	13 variables and four quarterly dummy variables	A back-propagation. A feed forward NN structure. A hidden layer with 5 nodes, 17 input neurons, and 1 output neurons. The NNs constructed in this study used the same set of initial weights.		NNs perform better than a probit model in predicting credit union failures	Financial distress
Altman et al. (1994)	Binary (classify)	15	80.80	30.20	15 business ratios	NNs with varying degrees of complexity were trained using ratios from period T-3 followed by testing in period T-1 from the same sample and also an independent sample. The most efficient results were obtained with a three-layer network, comprising 15 neurons in the first hidden layer, 6 neurons in the second hidden layer, and 1 neuron in the output layer. Discriminant analysis		NNs have "significant capacities for recognizing the health of companies with results that are near or superior to the results obtained through discriminant analysis."	Financial distress
Wilson and Sharda (1994)	Binary (classify)	5	NA	NA	Altman's five financial ratios: (1) working capital/total assets, (2) retained earnings/total assets, (3) earnings before interest and taxes/total assets, (4) market value of equity/total debt, and (5) sales/total assets	The authors used a BPNN	The authors used BRAIN-MAKER for NNs, and SYSTAT for discriminant analysis	NNs performed better than discriminant analysis	Bankruptcy

(continued)

Table 3 (continued)

Authors	Output variable	Number of input variables	Learning sample size per input variable	Testing sample size per input variable	Description of input variables	NN architecture, other AI/ES methods, and statistical method	Software	Summary of findings compared to statistical methods	Domain
Coats and Fant (1993)	Binary (classify)	5	29.40	29.40	five ratios chosen by Altman: (1) working capital/total assets, (2) retained earnings/total assets, (3) earnings before interest and taxes/total assets, (4) market value of equity/total debt, and (5) sales/total assets, and (6) overall index (known as Altman's Z score [EI Altman's "Financial ratios discriminant analysis, and the prediction of corporate bankruptcy."	The authors used a learning algorithm called Cascade Correlation (or Cascor) (Fahlman and Lebiere 1990). The authors claimed that Cascor overcomes several limitations of the more common back-propagation approach. Cascor begins with no hidden nodes, and then incrementally creates and install hidden nodes (one at a time) to improve the network's ability to categorize it. It is the hidden nodes, and their manner of connection with every input and output node and to each other, that makes a Cascor NN capable of elaborating on hidden structures in the data. One of the advantages of Cascade Correlation over previous NN designs is that Cascor automatically self-determines the number of hidden nodes necessary to detect all of the features of the pattern. With the other NN methods, extensive human trial and error is usually needed to discover the manner of hidden nodes that best enables good predictions. The number weight assigned to the connection of any two nodes reflects the direction (positive or negative) and relative strength of the relationship between the nodes. Determining these weights is the focus of the NN's computational process. In essence, the network's knowledge about one node's influence on another is encoded in the connection weights		NNs performed significantly better than other models for years 2, 1, and 0 prior to going-concern audit opinion	Financial distress

(continued)

Table 3 (continued)

Authors	Output variable	Number of input variables	Learning sample size per input variable	Testing sample size per input variable	Description of input variables	NN architecture, other AI/ES methods, and statistical method	Software	Summary of findings compared to statistical methods	Domain
Fletcher and Goss (1993)	Binary (classify)	3	6.00	6.00	Three variables (1) current ratio, (2) quick ratio, and (3) income ratio (net income/working capital)	The authors developed five BPNN models and compared their forecasting ability with that of a logit model. To develop the five BPNN models, the authors used three input nodes, each corresponding to an independent variable, one output node, representing the bankruptcy risk index, and hidden nodes ranging from three to seven, respectively. The authors use this approach to determine the optimal network architecture	NueralShell 4.1	NNs performed significantly better than discriminant analysis	**B**ankruptcy
Salchenberger et al. (1992)	Binary (classify)	6	33.33	40.67	Six categories of variables: (1) capital, (2) assets, (3) management, (4) earnings, (5) liquidity, and (6) size	The authors used a BPNN, which is a single, middle-layer, feed forward NN, consisting of five input nodes, three middle-layer nodes, and one output node	NeuralWorks	NNs performed as well or better than a logit model when tested on a matched sample. NNs performed significantly better with a data set that was more fully diluted with healthy institutions	Bankruptcy
Tam and Kiang (1992)	Binary (classify)		NA	NA		The authors used a back-propagation model	BPNN procedures in Pascal and run on an EMX machine	NNs performed significantly better than a decision tree approach (ID3) and a nonparametric classification method (KNN)	Bankruptcy

(continued)

Table 3 (continued)

Authors	Output variable	Number of input variables	Learning sample size per input variable	Testing sample size per input variable	Description of input variables	NN architecture, other AI/ES methods, and statistical method	Software	Summary of findings compared to statistical methods	Domain
Raghupathi et al. (1996)	Binary (classify)	13	3.85	4.00	13 variables	The authors used PDP back-propagation algorithm. (1) One hidden layer with 10, 15, and 20 nodes, and (2) two hidden layers with 10 and 15 nodes. For each configuration, the training was halted after either 10,000 iterations were run through the training set or when the network had learned all the training examples, whichever occurred earlier	Normalized input data by inputting them into a LOTUS worksheet.	NNs provide "suitable models for bankruptcy prediction." ANN model with two hidden layers had close to a 99% prediction accuracy	Bankruptcy
Odom and Sharda (1990)	Binary (classify)		NA	NA		Back-propagation rule. A three-perceptron network consisting of an input layer, a hidden layer, and the output layer		NNs performed at least as well as discriminant analysis	Bankruptcy
Lee et al. (2012) [26]	Binary (classify)	10 (1 layer)				The authors used Logistic Regression (LR) as a good choice for binary data, the Moving Average (MA) method as a good for simple prediction, while the supervised Back-Propagation Neural Network (BPNN) method as a good for long term data with 2 hidden layers	Work Toolbox of MATLAB	The research results reveal that LR performs better than the other methods although MA is better suited to the management of convenience stores	fresh food sales forecasting

(continued)

Table 3 (continued)

Authors	Output variable	Number of input variables	Learning sample size per input variable	Testing sample size per input variable	Description of input variables	NN architecture, other AI/ES methods, and statistical method	Software	Summary of findings compared to statistical methods	Domain
B. Abdulhai et al. 1999 [72]	New case	5 variables in 16 loops at 7 different time periods	180 training records	25 testing record, 25 validation-records	Speed, density, distance, time and equilibrium speed, data from a total of 16 loop detector stations were used. (5th station is the middle one). The extents of prediction in future were: 30 sec, 1, 2, 4, 5, 10 and 15 min	Short term traffic flow prediction system based on an advanced Time Delay Neural Network (TDNN) model with one hidden layer, the structure of which is optimized using a Genetic Algorithm (GA). Each neuron is provided with a memory in order to remember previous layer outputs for N periods. For GA the number of generation was set to 30 and the population size to 300		The used Time Delay Neural Network (TDNN) and Adaptive Time NN (ATNN) model showed potential to be superior to other well-known neural network models as the Multi-Layer Feed-forward (MLF) and to classical statistical prediction models. Percentage error for TDNN with full spatial contribution is the lowest	Advanced traffic management and prediction

to select the appropriate ANN's architecture. In both fields, the used terminology is quite different. Salre provides interpretation from ANN to statistic terminology, see Appendix.

Indeed, concerning the application level, there are many resemblances between ANN and advanced statistical methods. In some cases, ANN outperform statistical methods, while in other cases statistical methods are superior to ANN. Statistical and ANN are complementary tools with overlap in theoretical and application of fields. None of them should replace the other; they are complementary tools with commonality in theoretical and application of fields. The future trend is how to merge them for optimization and high quality researches. In section five, we are going to present some of these trends.

4 Various Common Performance Metrics Researchers Uses to Assess Effectiveness of the New Non-typical Methods

Different studies used different metrics performance to judge the success of the new methods comparing to the statistical techniques in different domain. For example: In the auditing and fraud risk assessment domain, the type 1 and type 2 error rates are applied. Type 1 error occurs if the applied method indicated fraud, when in fact there is no fraud. Similarly, a type 2 error happens when the applied method indicated no fraud, when in fact fraud exists.[2]

Mean square error (MSE): in forecasting domain;

$$MSE = \frac{\left(\sum FE\right)}{N-1}$$

where: FE represents forecast error and computed as the difference between actual value and predicted value. In some studies calculated as: MSE = 1/n * [Actual − Forecast]2 [37, p. 2108].

The other metrics like (1) median of the absolute deviation (MAD) $= median_i(\left|X_i - median_j\left(X_j\right)\right|$[42, p. 913]; (2) root mean squared error (RMSE) = SQRT(MSE); (3) root mean absolute error (RMAE) [89, p. 56]; (4) coefficient of determination (R-square) criteria; (5) Average Absolute Error (AAE) which is defined as the absolute of the difference between the actual value and the predicted neural output [72, p. 10] $AAE = \frac{\sum\left|\left(y_{actual} - y_{predicted}\right)\right|}{n}$ and (6) Average absolute percentage error value computed as:

[2]Type 2 errors are very important because that directly affect the quality and effectiveness of an audit. Such errors could easily result in an audit failure. If an auditor fails to identify a material fraud and gives a client a clean-audit report, then there is little doubt that an audit failure has occurred. On the other hand, a type 1 error has a direct impact on audit efficiency as it forces the auditor to increase substantive testing and over consume organizational resources. Persistent type 1 errors could also affect trust in the audit and risk assessment process [36, p. 207].

$$APEV = \left[\frac{\left(\left| y_{actual} - y_{predicted} \right| * 100 \right)}{y_{actual}} \right] / N$$

N is the total number of records for which predictions are made [72].

5 Contemporary Directions on the Use of New Methods

As we have seen in the ANN architecture section above, many limitation regarding the selection of ANN parameters does exist. From the non-typical methods side, it is difficult to report the results of an analysis in a concise statement. From the coefficients in a statistical regression side, it could not be explained as in the case of ANN's weights. In a way, the weights reflects the "importance" of an input, but complex interactions in the hidden layers make such an analysis very difficult [19].

Therefore, to overcome some restrictions of using one ANN approach, hybrid methods of both non-typical methods - and even in some cases traditional statistical models [86]—are suggested to yield better results [36].

For example, compounding Fuzzy Inferential System with Neural Networks was suggested to reach a learning system to transfer professional behavior to Fuzzy rules. Fuzzy logic is employed to gain more information from the data through the inferential ability of the fuzzy systems by means of logical rules. Transforming this information into fuzzy rules help -the network- better to understand the learning ability by the neural network. "Fuzzy-neural networks employ Fuzzy understanding system and the ability for neural learning. Therefore, Fuzzy-neural system is able to model the unreliability and inner lack of precision of the data due to using the learning ability of Fuzzy-neural networks" [42].

Calderon and Cheh (2002) noticed a study that describe an innovative application of a hybrid intelligent system that integrated an expert system and an NN model to formulate a preliminary control risk assessment [36]. The authors applied an expert system to provide a user interface and to represent, through a series of logical rules, the internal control structure information and relationships. Pre-processed data from the expert system were fed to the NN, which were used to model the more complex relationships in the auditors' control risk assessment. The research demonstrates that NNs can be coupled with expert systems technology to model control risk assessment. Unlike traditional expert systems where rules are the way to express knowledge, NNs learn patterns and relationships in complex data and generate their own rules through an iterative learning process. The two techniques complement each other in certain judgment tasks where some degree of preliminary data processing that conforms well to logical rules is needed prior to an assessment of complex relationships that involve a large number of quantifiable variables [36].

Usually Genetic Algorithm (GA) are used to make better optimization of the NNs. Finding optimal set of rules that govern the data under study that can help selecting inputs for the NN, which means saving costs and time and boosting for

better NN performance. For example: NNs hybrid models with Genetic Algorithm (GA) are suggested to be more effective in classifying financially distressed firms than traditional BPNN [36].

Ferreira et al. (2008) used modified genetic algorithm in a new hybrid model with MLP ANN for time series forecasting [90]. The GA function to address the issue of big number of parameters and to tackle the difficulty of obtaining an analytical solution. GA used to reach best solution. In their suggested model, they defined three dimensions of parameters for the algorithm scheme: (1) the number of time lag for selecting observation for the series, (2) the number of the transfer functions in the ANN hidden layer, (3) the training algorithm for the ANN. The criterion to be reached by the network in each run is the minimum fitness value identified by the following function:

$$\text{Fitness} = \frac{1}{1 + \text{Mean Squared Error}}$$

Ferreira et al. (2008) trained and verified their time series prediction NN with the utilization of GA. Tiago generated a population of individuals (represented by a chromosome) in each round [90]. Each chromosome composed of a three-layer ANN. Each layer are defined by one of the three parameters mentioned above consequently (i.e. first layer is defined by the number of time lags, the second layer is composed of a number of hidden processing units (sigmoidal units) and the third layer is composed of one linear processing unit) [90].

The mechanism of the GA applied by Ferreira et al. (2008) is as follows: each individual chromosome will evolve as replicas from different initial ANN state and hold out cross validation set. The round replica fulfill the minimum fitness function. Above is selected to represent the best individual of the population. When minimum fitness is reached, stopping criterion is activated for that individual and the GA evolved towards a good fitness solution. Therefore, a number of generations of best individuals are created and new fitness evolutions grow up, if the fitness of the best individual has attained or surpassed the initial value identified in the previous round. Using a combination of quantitative and qualitative factors in researches with NNs. Hybrid statistical/ANN models Yim and Mitchell (2005) suggest that using hybrid models of NNs and statistical techniques may help overcome two of NNs obstacles as follows:

- Selecting input variables for the neuron using statistical model (like Discriminant Analysis) reduces the risk of over fitting and the time consumed to select the model.
- Condensing information efficiently by using output from statistical model as input to the NN,
- And/or using statistical models in input and output selection for the neuron [56].

Statistical techniques could help in training the NNs also. Sometimes training algorithms for the ANN could be inefficient, so, Sarle (1994) suggest using some statistical procedures of a common statistical software package to be used for training of various non-typical ANN [18].

Mira and Sandoval (1995) deduce an improved algorithm for the training of feed forward neural networks with incomplete data based on maximum likelihood considerations [86].

6 Conclusion

This chapter highlights the importance of using ANN, one of the data mining techniques that can resolve actual problems in business. ANN should not replace statistical methods. They are complementary tools with overlap in theoretical and application of fields. Further research should be directed towards the development and evaluation of ANN method in business researches. Future research on ANN could engage in hybrid methods including non-typical approaches and traditional statistical models.

Appendix

Neural network terminology	Statistical modelling terminology
Neural network	Model
Synapses, weights, connectivity, etc.	Coefficients of the model
Inputs	Independent variables
Outputs	Dependent variables
Outcome or target	Expected value
Node	Logistic regression
Hidden layer	Intermediate set of logistic regressions
Learning	Coefficient estimation
Supervised learning	Regression, discriminant analysis, etc.
Unsupervised learning	Principal components and cluster analyses
Architecture	Model description (e.g., number of nodes and layers)
Convergence	In-sample performance
Generalisation	Out-of-sample performance

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Research Skills for Business Researchers

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1 Introduction

It has been proved that a researcher cannot conduct research just through learning research methodologies and carrying out relevant tasks. Rather, he/she should have specific skills to help him/her meritoriously carry out these tasks. Skill can be defined as the ability to do something effectively, especially through deliberate practice. Hence, we can define research skills as the abilities that help a researcher conduct research effectively, especially through deliberate practice.

Research skills vary according to their relevance from technical skills to soft skills. Technical skills lie in the core of research work and are inevitable to conduct it. In this chapter, they represent three skills: using library resources, data analysis, and technical writing. The other part of research skills is soft skills. These skills are not inherited in the research work; however, essentials to conduct it. In this chapter, ten soft skills are presented: patience, listening, asking good questions, doing parallel tasks, time management, self-learning, critical thinking, team working and networking, presenting, and emotional intelligence (Fig. 1).

This chapter is not only a conceptual one. It embedded practical parts with strategies and principles to help acquire and develop targeted tasks. Some of these strategies are skill-specific and are incorporated when discussing their relevant skills. Additionally, the ten principles are general and can be applied to different skills, which are discussed at the end of the chapter.

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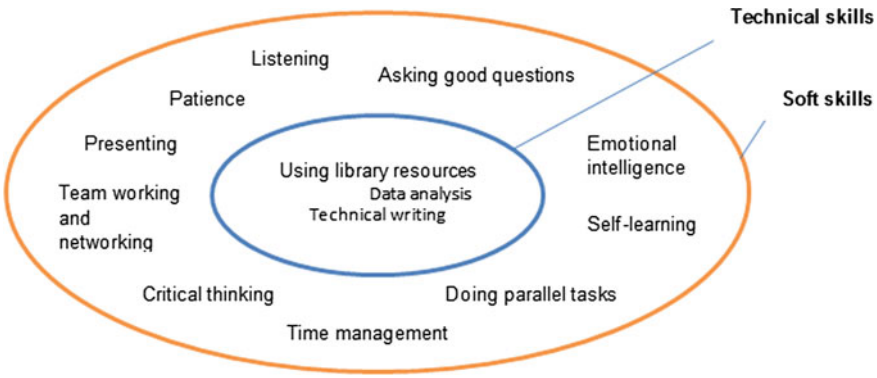

Fig. 1 Research skills for business researchers

2 Technical Skills

2.1 Using Library Resources

To design and conduct research, researchers should first be able to effectively use library resources. Yin's work [1] stated that the skill means spending effective time in an academic library in a way that yields a review for the literature.

The skill, thus, includes being able to allocate studies, whether they are books, journals, conferences, etc. It also means the ability to choose which of these resources needs to be included in the literature review report, and finally, analytically summarize them in a report.

Yin's work [1] elaborated that the researchers' skill could be developed over time through engaging a library and with experiences that began in our childhood. Over time and with practice, a researcher can learn how to access library resources, locate them, evaluate the quality and relevance of them, and summarize them in a review.

2.2 Data Analysis

Analysis is the ability to collect relevant data, clean it and manipulate it in a way that enable describing phenomena; discover patterns, connections, and predictions and make decisions. The data analysis skills can be grouped according to the three steps: data collection step, data cleaning step, and the analyzing step.

The first step in the data analysis process is the data collection step. In this step, a researcher should be able to identify the appropriate source of data. He/she should also be able to identify the participants of a study; the population, the type, and the size of the sample. Additionally, determining the appropriate type of data to

be collected is another decision that should be made by the researcher. Finally, the researcher should consider locating an effective data collection instrument [1].

The second step in the data analysis process is the data cleaning step. Once the data is collected and recorded, it should be screened for incompleteness, duplications and errors. Several techniques could be used according to the type of data. For example, Microsoft Excel can be used for screening quantitative data, whereas textual data spell-checkers can be used for qualitative data.

The third and final process, in the data analysis is the analyzing step. The step contains the ability to select the appropriate method for manipulating data, mathematical or otherwise. A researcher should be aware of the assumptions, outcomes and limitations of each method. He/she should then be able to judge and interpret the computed results. Being able to effectively use analysis software, e.g., SPSS, EViews, Amos, etc., is an important component of this skill.

2.3 Technical Writing

In order for a researcher to communicate his ideas with the scientific community, he/she should have an excellent technical writing. Yin [1] stated that writing is more than recording ideas on paper or in a computer file. Rather, it is also organizing ideas, writing for permission to use someone else's survey responses, preparing interview questions, writing for permission to access a work field, taking notes during a field work, etc.

The skill also includes being able to write for several audiences. For example, a researcher needs a more academic style when writing to his/her supervisor unlike when writing to a public audience. Moreover, he/she needs a more robust style when writing to an academic journal.

Acquiring a proper technical writing skill must not be taken for granted. Instead, excellent writers usually develop numerous drafts, receives feedback from others, review their outlines and finally reach a final version of their work.

3 Soft Skills

3.1 Patience

Patience refers to the ability to stick to the researcher's target in the face of the inevitable frustrations, uncertainties, and even pleasantries that he/she may confront while doing his research [2]. In the field of social sciences, the researcher may also need to deal with embarrassing or difficult people or situations.

The patience skill includes not only the ability to move forward with the research despite these situations, but also the ability to positively overcome them.

For example, in action research, the researcher should be able to overcome the awkwardness of the first few field visits, pretend to enjoy the items 'intensely disliked' with participants, and overcome stress [3]. Furthermore, an interview with a participant may last up to two hours. Thus, the researcher should be able to keep encouraging participants to have the time and opportunity to reconstruct their own experiences in their own words. In addition, the researcher should preserve comfort and calmness while participants express ideas that may bother him.

3.2 Listening

The listening skill is considered to be a very important skill, especially in the qualitative research field work. The work of Creswell [2] explained that the listening skill exceeds the form of hearing to call upon all of the researcher's senses, including the intuition.

The targeted skill here is to be able to capture the most possible amount of information about the environment. The capturing could be explicit or inferential. For example, listening can begin when a researcher engages in a group of participants and listen to their words. The researcher then is desired to be able to recognize the pitch and tone of conversations and the body language of the participants in order to "listen between the lines", which may reveal participants' motives, intentions, or deeper meanings. The more the researcher is able to listen for those signals, the better his field work will be.

Creswell [2] suggested that listening also has a specific visual mode, which takes the form of being an observant. For example, your research work may require the observation of the crowd, scanning the people around you and finding a particular person or object.

Listening may also include the time or pace of an environment, commotions, and the general stress that seems to be in the air. The more the researcher is able to measure these features, the preciser and richer his field work is.

3.3 Asking Good Questions

Rather than only searching for answers, asking good questions can help you getting an excellent research. Without asking good questions, a researcher risk of collecting tremendous amounts of irrelevant data is high and might simultaneously lead to miss other important information.

The researcher should keep asking a series of good questions from the beginning until the end of his research work. For example, a researcher should ask himself: why am I going to choose this research topic? Is it in line with the recent trends? Whom would it be useful for? Is it important for the scholar work? etc.

The skill is also largely needed while doing qualitative field work, e.g. interviews and focus groups. A researcher is expected to be a good active listener; he should not be a passive one. The participants may over-express their opinions and maybe their experiences in life, which might take the conversation to another way than expected and that is less useful for the researcher. Thus, the researcher is expected to keep the conversations in a way that yield to the most relevant data.

3.4 Doing Parallel Tasks

Rather than working in a linear approach, researchers usually need to work in a recursive way. This intensifies the competence of doing parallel tasks. For example, the qualitative researcher will have to be able to take field notes while making field observations, or take notes at a meeting while managing a conversation.

The researcher should keep up with such tasks over a long period of time. Sometimes, if a researcher put his pen down, an unexpected field event might suddenly happen. Thus, the researcher should be able to overcome fatigue and only take breaks when leaving the research field to a private environment.

Other multitasking forms in qualitative research lies in the need to merge different research phases such as data collection and data analysis. For example, while the researcher is collecting data, he will simultaneously need to be thinking about their analytic implications, in order to determine whether it is needed to collect additional data to confirm or to augment the collected data.

Another realistic example could be that a qualitative researcher may need to simultaneously listen to a participant in an interview, observe his/her body language that might have different cultural meanings, put attention to the participant, take notes, and think about the next follow-up question.

3.5 Time Management

Perhaps the most challenging feature of the research career is its unstructured nature. This means that while a researcher is carrying multiple responsibilities, he/she is expected to experience various distractions that can disrupt research productivity. Therefore, time management can have a critical role. If a researcher fails to manage time, he/she might end up with a very low productivity. Furthermore, the advantages of effective time management may expand to increase job satisfaction and low-stress outcomes [4].

Claessens et al. [4] defined time management as "deliberate actions aimed at the effective use of time to achieve specific goal-directed activities; is a skill necessary to maintaining scholarly productivity". Several strategies can help researchers manage their time, in order to reach more success in their research work. Some of these strategies are:

- *Setting realistic goals.* Researchers should identify measurable, challenging, and attainable goals, and direct their efforts towards them. These goals could be categorized as long-term goals, e.g. publishing a research article, and short-term goals, e.g. finishing an assignment. Further, a researcher should periodically review his/her goals in order to evaluate performance and recognize potential barriers/facilitators.
- *Prioritizing*. Prioritizing goals is a critical part in time management. A researcher should arrange his/her goals according to priority and start working considering these priorities. Although priorities differ from a researcher to another, it is highly recommended to prioritize the researcher spirituality, health, and social life. Without these priorities, the researcher's energy would fade over time. Additionally, he/she would not be able to feel the happiness of achievements. Finally, a researcher should learn to say "no" for distractions.
- *Overcoming the desire for perfection.* Perfection appears as an enemy of time. It is very important for a researcher to target high-quality work. However, targeting perfection is not in favour of him/her. For example, a researcher may spend much time trying to capture all the articles related to his/her topic of study. He/she may also overly spend time reviewing his/her work and making adjustments. These behaviours will possibly end up with breaking deadlines or neglecting other important actions.
- *Being flexible*. Emergencies may occur to researchers in a way that can damage robust schedules. Thus, a researcher should maintain flexible schedules. He/she may leave a number of hours at the weekend to cover emergencies. Moreover, in case that his/her time priorities change, it is suggested to exchange the schedule tasks without neglecting any of them.
- *Self-rewarding*. Self-rewarding is proved to raise the motivation for work. It is suggested that a researcher directly reward him/herself after achieving the scheduled goals. In case of big projects, it would be a good idea to reward him/herself after completing parts instead of waiting for the completion of the entire project [5, 6].

3.6 Self-learning

As society moves from the age of information scarceness to the age of ample one, self-learning emerges as an opportunity for those who seek success in their lives, containing researchers. It is defined as "an active and constructive process where learners set goals, monitor their learning, and participate their learning cognitively, motivationally and metacognitively through controlling their motives and cognitions" [7].

With the dominance of online resources, researchers are now able to learn almost what they want. They have been able to acquire the knowledge and the skills that they need when they need it, in order to advance their research performance. Such learning style results in many achievement ranges such as learning something new,

feeling better about herself/himself as a learner, personal freedom, changed learning beliefs, new career interest, getting certificate, getting a new job, etc. [8].

Several strategies are sought to raise the effectiveness of self-learning:

- *Selectivity*. Keeping in mind the huge mass of information available at the different sources, researchers should pay attention to select the information that best contribute to their research achievement. They should be aware of the credibility and quality of the learning sources. They should also select the information that is most relevant to their goals.
- *Decentralizing the sources of self-learning*. Although a researcher might keep focus on a piece of information, he/she might be having trouble to comprehend it. Using different sources of information can make the picture clearer. It is suggested that a researcher use multiple sources such as books, articles, online lectures, podcasts, and webinars. The wider a researcher's base is, the more effective self-learning will be.
- *Consult an expert*. Although a researcher can highly benefit from self-learning, he/she can maximize these benefits when consulting an expert in his/her self-learning journey. Consulting an expert can save time and can direct the researcher to more effective learning sources and strategies. The expert can be a professor, a colleague, a friend or a learning community.

3.7 Critical Thinking

Although academic research comprises collecting information, analyzing data and reporting results, it cannot merely be conducted based on such actions. Academic research cannot be achieved without raising questions, creating ideas, evaluating perspectives and developing arguments, which are all critical thinking aspects. Critical thinking is defined as "the ability to raise and examine an issue from different perspectives by providing supporting and opposing arguments and exploring its reasons and consequences. Moreover, this examination should be based on reliable evidence gathered from various sources as well as a personal opinion, which has to be, preferably, skeptical and questionable to avoid bias" [9]. Critical thinking is proved to develop academic achievements and considered as an important tool for researchers.

Despite the fact that humans are naturally born with the ability of thinking, critical thinking is a skill, acquired and developed through several strategies:

- *Questioning*. Raising thought-provoking questions can develop a researcher's critical thinking. He/she could raise questions such as "what would happen if …" (prediction), "what is the difference between … and …" (comparison), or "what is another way to look at …" (taking other perspectives) [10]. A researcher may also question the assumptions he/she believe and the small norms that are usually taken for granted.

– *Role-playing* [10]. Putting oneself in the shoes of others can help imagining their perspectives, feelings, opinions, and behaviours. Applying this strategy helps a researcher to be more persuasive in his/her arguments.
– *Reading great works*. Reading thought-provoking books and articles can also develop critical thinking skills. The strategy suggests engaging deeply in the readings, reflecting on what is read, and discussing it with others. A researcher may also benefit from joining reading communities to develop the skill.
– *Surrounding oneself with people smarter than him/herself.* It has been claimed that if you are the smartest person in the room, then you are in the wrong room. Engaging with smarter persons help a researcher nurtures his motivation, sharpen his thoughts, and recognizes new experiences.

3.8 Team Working and Networking

Academic research does not only mean to sit in front of a laptop or to collect and handle information. Conducting a high-quality research is also a matter of team working and networking.

Team working can happen when engaging other people to assist a researcher in conducting his/her research. For example, a researcher might need company for security reasons during the fieldwork [11], due to differences in gender and culture. A researcher may also need other colleagues to perform some research functions. For instance, when a study needs intensive data collection or collecting data from multiple sites, a researcher may engage other colleagues in the data collection process. Such colleagues might be involved for subjectivity reasons, i.e. when coding qualitative data; more than one researcher is needed to increase the reliability of the coding.

The more advanced form of team working lies in research collaboration. Research collaboration is defined as "doing research activities with someone outside the respondent's department with the aim of generating output" [12]. Based on this definition, a business researcher who works with another business researcher would not count as collaboration. However, a business researcher who works with a biology researcher would count as collaboration. Research collaboration can enhance access to resources and expertise and increase visibility and prestige [13]. This type of collaboration, especially international ones, can also solve complex problems and reach high-quality research. Such collaborations usually begin with informal relationships and communications, and ends up with a formal collaboration.

In addition to team working, researchers should improve their skills in professional networking. Professional networking is described as contacting others through conversations, where advices or research issues could arise [12]. Research shows that affective, informal and non-structured relationships, implanted in professional networks, improve research productivity. They embed diversity and give access to resources and opportunities as well as information paths that are expected to reach research success.

Researchers should improve their team working and networking skills. Such improvement could occur using several strategies:

- *Engaging in the academic community*. A researcher should surround him/herself with colleagues from the same and other disciplines. It is advised that he/she join conferences, workshops, seminars, etc. to communicate with them. He/She might also use social networks such as Research Gate, LinkedIn, Academia, Mendeley, etc.
- *Knowing each other*. Different researchers are expected to have different interests, targets, and backgrounds. Therefore, knowing each other helps to build mutual concepts.
- *Support*. Researchers should support each other by sharing resources, knowledge and expertise. Such support might build confidence and loyalty, which give the opportunity to strengthen relationships.
- *Responsibility*. All researchers should clearly know their roles. They should, accordingly, display responsibility and accountability on what needs to be done.

3.9 Presenting

In addition to handling a research through a written report, a researcher needs to present his/her work as well. He/she might present his/her work to a supervisor, as a requirement for completing a course or complementing the curriculum vitae he/she might also present the work in a conference. Hence, a researcher should develop presentation skills to convey the importance of his/her work. Developing this skill can happen by using several techniques such as:

- *Preparing*. In almost every presentation, an audience will recognize who is prepared and who is not. A presenter should prepare him/herself before introducing his work. He/she might do his/her presentation in front of friends or family. He/she should consider their feedback and repeat it several times. Practicing in front of a mirror would also help to recognize body language and improve the own performance. All in all, "practice makes it perfect".
- *Looking neat.* In order to be persuasive in his/her presentation, a presenter should dress well. He/she should select neat, clean, and professional clothes. Being meticulous about hair and shoes also counts.
- *Having a positive attitude*. It is very important to maintain a positive attitude while presenting. A presenter should speak confidently to his audience. Smiling to them will also have a positive affection. Displaying a sense of humour can also help when is used politely, professionally and moderately.
- *Controlling voice tone*. To keep the audience engaged, a presenter should make infection in his/her voice. He/she should be excited about the topic presented. He/she should speak loudly, but not yell, vary his/her tone, and use silence at places to let the audience digest the presented information.

– *Controlling body language*. A presenter should not step back and forth or walk out of nervousness. Rather, he/she should be calm and confident. Making eye contact, without focusing only on certain parts of the audience, will keep the audience engaged. Additionally, using hands to emphasize points can make them more persuasive and interesting.

3.10 Emotional Intelligence

Although learning is seen as acquiring, storing and manipulating information, a new trend in educational psychology has proposed that academic achievement is subject to motivations and emotions as far as cognitive factors [14]. Accordingly, emotional intelligence can be considered as an important research skill.

Emotional intelligence is defined as "the capacity of an individual to monitor their own and others' feelings and emotions, to discriminate among them and to use the information to guide their thinking and actions" [15]. It comprises four domains: self-awareness, self-management, social awareness and relationship management [16]. The concept, thus, implies that people, who are able to control their negative emotions and replace them with positive ones, are more able to manage themselves and their surroundings. They are less likely to become irritated or dejected, when facing different inevitable unfavorable situations in life or when giving up on their targets. More specifically, the cause-effect is a two-way relation. It can cause positive emotions such as pleasure and hope, which can be responsible for targeted achievements and similarly boredom and nervousness, which can led to failure and impact on targeted achievement [17].

In this way, emotional intelligence can have its effects on research achievement. Successful researchers are those who have personal abilities and flexibility. They have the abilities to manage stressful situations in a calm and proactive manner, and are capable of identifying and solving possible problems.

Several strategies are expected to improve emotional intelligence:

– *Noticing self-emotions*. It is important that a researcher notice at the end of the day how he/she feels about the different experiences, e.g. how he/she feels when he has been denied from access to a fieldwork. It is also important to recognize his/her reactions to the different feelings; e.g. what does he/she do when he/she has been embarrassed by an interviewee? Writing emotions on a piece of paper can help better recognizing them.
– *Being open-minded*. An open-minded researcher can be able to keep calm, learn new insights and deal with conflicts. In an interview, for example, openly listening to a participant will neutralize the interviewer perspective and yield to the real perspectives of the participants. In addition, listening to conflicting debates can help a researcher have broader knowledge and understanding.
– *Improving empathy*. Empathy means being able to recognize the feelings of others and share these feelings with them. It can help a researcher more deeply under-

standing the participant in a fieldwork and reflect this understanding in his/her work. Empathy can be improved by listening to others, reading their body language, and sometimes directly asking them about their feelings.

4 How to Acquire and Develop a Skill?

Acquiring and developing research skills are challenges encountered by researchers. The process of acquisition and development is a matter of hard work and time. However, extensive research shows that many people not only fail to become high performers at what they do, despite the years spent doing it, but also they do not even get better than they used to be when they started [18].

This is due to their unfavorable way of practice. Research shows that effective practice should be intentional, planned, and systematic. In this part, ten principles are shown for effectively acquiring and developing skills [19].

4.1 Choose a Favourable Project

Naturally, people learn faster about things that they care than things they do not. The more excited and motivated a researcher is about a project or a problem, the more quickly he will acquire its relevant skills.

4.2 Focus Your Energy on One Skill at a Time

Acquiring new skills requires concentration and attention. If you have one or two hours a day to dedicate on acquiring and developing your skills, do not spread your time and energy over several skills. Rather, try to focus only on one.

4.3 Define Your Target Performance Level

A target performance is defined as the statement that reflects how well your desired performance at the desired skill is. According to your target performance, you will clearly dedicate your time and effort. If you are targeting a world-class mastery, then you should dedicate 10,000 h of deliberate practice. However, if you just want to reach a decent and not embarrassing performance, 20 h of practice might be enough.

4.4 Deconstruct the Skill into Subskills

Almost every skills consist of several subskills. Once you have determined a skill to focus on, break the skill down into the smallest possible parts. Deconstructing skills helps focusing on the most critical parts/subskills in the targeted skill.

4.5 Obtain Critical Tools

Critical tools are the components, resources, or environment that should be obtained to perform the skill. For example, if you would like to develop your data analysis skill, you need to have a computer with a data analysis software. By ensuring the availability of such tools, you will be able to maximize your practice time.

4.6 Eliminate Barriers to Practice

Barriers of practice are things that can hinder practice. These barriers could be unavailable tools. They can also be environmental distractions such as incoming calls or emails. They could also be emotional barriers as fear or embarrassment.

4.7 Dedicate Time for Practice

Rather than practicing a skill in your free time, you should just dedicate time to practice a skill. Unfortunately, we usually want to acquire new skills while watching TV, playing, etc. The best approach to make time for acquiring the skill is to identify low-value activities and plan to eliminate them. By eliminating them, you can dedicate more time for skill acquisition. It is recommended to locate at least ninety minutes a day for a skill. The first days might be hard. However, more practice will make things better.

4.8 Create Fast Feedback Loops

Fast feedback means getting information about how well are you performing, as soon as possible. The received information should be used to adjust your performance. You can get feedback from experienced mentors or devices that can indicate errors like computer programs.

4.9 Practice by the Clock in Short Bursts

Get a countdown timer and set it for twenty minutes. In the early phases of practice, time might pass slowly and you will feel that you have been practicing for a long time. The solution for this is to practice with the timer, no matter how tired and frustrated you get. Set aside time for three to five such practice sessions a day.

4.10 Emphasize Quantity and Speed at the Beginning

In the early phases of practice, you may reach frustration. Rather than trying to be perfect, focus on quantity and speed, while keeping a "good enough" level.

If you consider the above ten principles of skill acquiring and developing, you will get your skills in the most efficient and effective form.

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Surveys and Questionnaires

Serene Dalati and Jorge Marx Gómez

1 Introduction

Survey questionnaire is one of the classical approaches and methods of collecting primary data. A survey questionnaire is a research instrument which is employed by the researcher to collect data and information about the subject of study. The purpose of this chapter is to examine survey questionnaire as one of the methods applied in collecting primary data. The process of developing self-administered questionnaires is examined by clarifying the advantages and disadvantages of this instrument. Questionnaire design is a multifaceted process which requires careful consideration of different factors including purpose and objectives of the study, questionnaire format, response strategy and unit of analysis as well as different related factors. Survey questionnaires lack the comprehensive aspect of an interview, however, it is considered as an efficient instrument for data collection. The scope of this chapter is within business research studies, therefore examples and an illustration will be provided from research in business fields. The target audience focuses on students and researchers of business studies with an orientation towards behavioural management and marketing research. It could be argued that the competitive advantage of this chapter is simplicity, clarity and an attempt to illustrate the crucial aspect related to survey questionnaire design.

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2 Data Sources and Authority

This section aims to shed light on the nature and sources of data used in business research. This chapter clarifies mainly two sources and levels of data. Primary and secondary levels of data are examined. This section shall illustrate the nature of primary and secondary data and the sources these data could be obtained from.

2.1 Primary Data

Primary data is collected for the exclusive purpose, the research study [1, 2]. The collection of primary data can be obtained through observations, semi-structured and in-depth interviews and questionnaires [3]. Observation involves the systematic observation, recording, description, analysis and interpretation of people's behaviour [3]. The second method of collecting primary data are semi-structured and in-depth interviews, which can help researchers, gather valid and reliable data for the purpose of the research they are conducting [3].

2.2 Secondary Data

Secondary data is gathered and collected by someone else prior to the research and for purposes other than the current needs of the researcher [1]. Secondary data is usually historical and already collected. For example, databases like Bankscope or the Security Statistics contain broad, generally historical and statistical data about financial markets and banking organisations, which can be quite useful to the particular needs of a specific research study about financial organisations in the UK. Collecting secondary data has advantages and disadvantages. One advantage of secondary data is that obtaining this kind of data is not expensive and that secondary data can be obtained more rapidly than primary data [1]. The financial and time factors play an important role in the success of the research and secondary data could save on both elements. Collecting data that has been already collected and tested would save the researcher doing the fieldwork [2]. One of the disadvantages of secondary data is that it is obtained from data resources which are not designed to meet the specific needs of the research and the researcher. Does the data apply to the population of interest? Is the subject matter consistent with the research problem of definition?

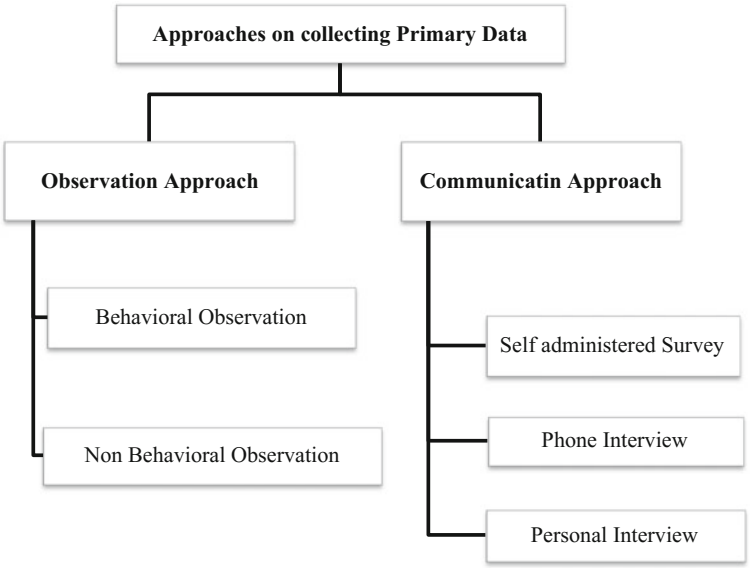

Fig. 1 Approaches on collecting primary data

3 Approaches on Collecting Primary Data

Collection of primary data may be applied through different approaches [4]. Data collection methods have been grouped into three categories consisting of observational methods, interviews and questionnaire surveys [5]. Two main approaches on collecting primary data are examined. The first approach follows an observation method in which the researcher observes conditions, behaviour, events, people or processes. The second approach follows a communication method in which the researcher communicates with respondents about the topic or research study. This could include examining attitudes, studying causes and nature of certain behavioural phenomena as job satisfaction, employee motivation or leadership behaviours. Figure 1 illustrates two main approaches on collecting primary data [6].

4 Self-administered Survey Questionnaires

Self-administered survey questionnaires could be conducted though different channels including mail, fax, computer, email, or the internet. Alternatively a combined approach could also be applied, subject to the requirement of the research study and nature of the environment under which the research is being undertaken. For example, it could be argued that in a business and social environment in Syria, post mail or paper and pencil survey questionnaire approaches would be a better strategy

than an online survey questionnaire, because Syrian respondents are still not familiar with the online environment. Technology is a significant factor in the investigation of the most appropriate approaches for survey questionnaires. The rapidly changing technology around the globe has played a significant role in survey research. In modern and advanced technology environments, paper and pencil survey questionnaires were replaced by computerised and online questionnaire approaches. Recent survey approaches which are rapidly growing include computer assisted data collection (CADAC), computer assisted survey information collection (CASIC), and computer assisted self-interviews (CASIs) [6]. Questionnaires are designed to obtain primary data which would be used to for the purpose of the research study. The researcher could apply a very well established approach which is a self-administered questionnaire method [7]. Postal questionnaires are very established and the traditional approach. However, one of the drawbacks of this approach is the absence of an interviewer to ask or clarify questions. Self-administered questionnaires are highly structured and emphasise on closed questions as they are designed in a simplified approach to assist the respondent to provide their responses [7].

4.1 Advantages of Self-administered Survey Questionnaire

In a study, which discussed the main advantages of the postal mail survey, the first advantage is low cost. Economy is one of the most obvious appeals of mail questionnaire. The post mail questionnaire does not require trained staff of interviewers. All it entails is the cost of planning, sampling, duplicating, mailing, and providing stamped self-addressed envelopes for the returns. The second advantage is reduction in biasing error. The mail questionnaire reduces biasing error that might result from the personal characteristics of interviewers and variability in their skills. The third advantage is that with self-completed questionnaire there is greater anonymity. The absence of an interviewer also provides greater anonymity. The assurance of anonymity with mail questionnaires is especially helpful when the survey deals with sensitive issues. On such matters, a mail survey may elicit a higher response rate than a personal interview. The fourth advantage is considered answers and consultations. Mail questionnaires are also preferable when questions demand considered answers or if the answer requires consulting personal documents or other people. The last advantage is accessibility. Survey questionnaires permit wide geographic contact at minimal cost [5].

In a study by Alan Bryman (2004), one of the advantages of self-completion questionnaires is that it is less costly to administer as interviews can be time consuming and more expensive [7]. Questionnaires can also be quicker bearing in mind that questionnaires do not come back immediately and may take several weeks to be returned. Another advantage would be the invariability of questions in the sense that there is no interviewer who asks questions in a different order of different approaches, meaning that there is no interviewer influence. Self-completed questionnaires are also more convenient for respondents as they can answer them at their own con-

venience and speed [7]. Cooper and Schindler (2014) point out that advantages of self-administered survey questionnaire include less cost, sample accessibility, efficiency in time, anonymity and topic coverage [6].

4.2 Disadvantages of Self-administered Survey Questionnaire

With the disadvantage of the self-completion questionnaire, there are a number of elements such as the possibility that the respondent does not clearly understand the questions and that there is no opportunity to probe the respondent to elaborate, especially if the questions were designed as open-ended. Also there is a possibility of missing data, which happens as the respondent does not answer all the questions listed. The ambiguity of the identity of the respondents who participated can additionally be considered as a disadvantage, as with postal questionnaires the researcher can never be sure who really completed the questions [7].

5 Disguising the Purpose of Research Study Survey

In certain situations the true purpose of the research study is disguised and concealed for different purposes which could include disguising the identity of the research study sponsor, or to obtain unbiased data. If that is the case a disguised question approach is designed to conceal the real purpose of the questionnaire [6]. In some cases where the purpose of the study examines an ethical problem or socially unacceptable behaviour, research respondents may be aware of the true answer but unwilling to provide it. In this case a disguised question technique could be applied to encourage the respondent to provide true answers and avoid giving biased or stereotypical data.

Here is an example of a research study, which examines the types of unethical behaviour and cheating among undergraduate students [4]. In this case the unit of analysis, which is the undergraduate student, may be able to provide the right information, but unwilling to share it because it would implicate them. The researcher could follow either a non-disguised question approach to obtain data for the questions designed in the questionnaire or disguised question approaches to guarantee true or arguably an unbiased response. Tables 1 and 2 illustrate the difference between projective and non-projective approaches.

In Example A, the researcher has followed a direct non-projective approach in designing questionnaire items. In consequence, and because of the nature of research study, there is a considerable possibility that the respondent will not provide accurate and true answers due to the sensitive nature of the questions, which would implicate the respondent.

In Example B, the researcher has followed an indirect projective approach in designing questionnaire items. It is argued that there is a better possibility that the

Table 1 Non-projective approach

Example A					
As a student at XYZ University, have you ever been engaged in the following behaviours? Please code your degree of agreement or disagreement with the following statements					
Scale: 1—strongly disagree; 2—agree; 3—not sure; 4—disagree; 5—strongly agree	1	2	3	4	5
1. Comunicating answers to a friend during exam	☐	☐	☐	☐	☐
2. Hacking into university computers to obtain exam questions	☐	☐	☐	☐	☐
3. Peaking at a neighbour exam during a test	☐	☐	☐	☐	☐
4. Using a term paper that is purchased or borrowed from someone else	☐	☐	☐	☐	☐

Table 2 Projective approach

Example B					
As student at XY University, have you ever seen or observed a student who has been engaged in the following behaviours? Please code your degree of agreement or disagreement with the following statements					
Scale: 1—strongly disagree; 2—agree; 3—not sure; 4—disagree; 5—strongly agree	1	2	3	4	5
1. Comunicating answers to a friend during exam	☐	☐	☐	☐	☐
2. Hacking into university computers to obtain exam questions	☐	☐	☐	☐	☐
3. Peaking at a neighbour exam during a test	☐	☐	☐	☐	☐
4. Using a term paper that is purchased or borrowed from someone else	☐	☐	☐	☐	☐

researcher will obtain more accurate data through the second approach as no legal or ethical implication would be related to the respondent.

6 Questionnaire Design

In the process of questionnaire design, the researcher could have an alternative of employing hybrid strategy and thus apply a combination of previously developed questionnaires, licensing previously developed questions or developing an original questionnaire to undertake the specific objectives of research. In the process of questionnaire design the researcher considers factors that are taken into consideration. These factors include careful design of the structure of questionnaire, questionnaire content and wording, and questionnaire response strategy. The chapter introduces the W model of questionnaire design.

6.1 6-W Model of Questionnaire Design

The 6-W model has been developed in this chapter to examine crucial questions that researchers should consider in the process of questionnaire design. The 6-W model of questionnaire design introduces a set of questions, which examine best approaches that the researcher needs to take into consideration in the process of questionnaire design. They are:

- What is the appropriate type of scale required to perform the research analysis?
- What type of response strategy is required (structured or unstructured)?
- What type of communication approach is required (disguised or non-disguised)?
- What is the unit of analysis that the questionnaire is designed for?
- What questionnaire sequence should for the questions be arranged?
- What questionnaire layout is required to accomplish research objectives?

6.2 Questionnaire Sections and Structure

Organising a questionnaire structure is a vital stage in the design of questionnaires. It is argued that questionnaires are structured into three sections, demographic, administrative, and research purpose sections [6, 8]. Figure 2 illustrates questionnaire structure categorization.

The administrative section has questions related to the identity of the participant, the interviewer in some cases, the survey questionnaire location and certain marking conditions related to the distribution of the questionnaire or environment in which the survey questionnaire is being conducted. Most of these questions are usually

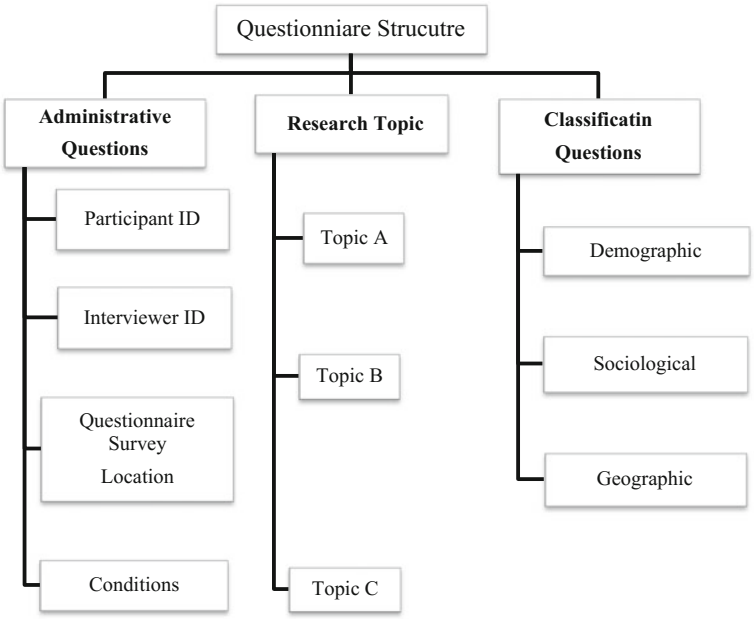

Fig. 2 Questionnaire structure

not officially stated in the questionnaire or are designed in the questionnaire layout. However, they are very important for analysing data and studying different patterns, which could help in discovering possible errors related to different factors including lack of precision or inaccuracy in sampling techniques, bias or missing data.

The classification section identifies certain demographical, sociological and geographical factors including gender, race, nationality, education, year of birth and other variables that could be related to the research study.

Research topic questions examine research study variables, which comprise of the research framework and constitutes the relationships between variables of study. In the example of a research study, which examines the relationship between sustainable leadership and organisational trust in Higher Education in Syria, the methodology is based on self-administered questionnaire survey. The research topic questions would be examining a set of measurement questions for sustainable leadership and organisational trust in Higher Education institutions.

6.3 Questionnaire Items, Content and Wording

The questions' content is related to the theoretical aspect when the instrument designer is developing the final questionnaire. The questionnaire designer examines

the questions' content in terms of the relations to the concepts, constructs and operational definitions of the study. The researcher, who is in this case also the instrument designer, defines the variables of the study, develops operational definitions, and designs the questionnaire by transforming the constructs of the study or the operational definitions into questionnaire items. In this process, the instrument designer must examine the relevancy and scope of questions. In addition, respondent's ability and willingness to answer the questions must be considered. Reliability and validity of an instrument must be considered in the process of questionnaire design. Reliability and validity of the questionnaire are related to developing accurate instruments. Questionnaire relevancy is crucially important and means that the data and information collected accurately addresses the research study objectives [2].

Questionnaire wording is another crucial factor, which plays a role to the success or failure of a questionnaire. The questionnaire designer should consider clarity and simplicity of words and vocabulary in the instrument. Clarity, simplicity and shared understanding of vocabulary employed in the questionnaire is crucial to instrument success. Questionnaire designer must take into consideration terms or vocabularies that could be biased or misleading.

7 Response Strategy

Response strategy is a major factor that needs to be taken into consideration. Response strategy refers to the degree of structure employed in the questionnaire. Questionnaire design could follow an unstructured or structured response approach. Unstructured responses (also referred to as open-ended responses) are designed to provide respondents with the freedom to choose how to respond or answer questions. Structured responses (also referred to as closed-ended responses or fixed-alternative questions) are designed to provide respondents with specific responses, which can be categorised into groups.

7.1 Open-Ended Response Questions

Open-ended questions are designed to provide respondents with freedom or to express their opinion on the topic of research. In this approach the researcher brings a question of study or a research problem and the respondent provides answers to the question. In the example of MATRE survey questionnaire, which was designed to examine alumni perception of the curricula for the Faculty of Business Administration, the final section of the questionnaire employed an open-ended response questions. Figure 3 illustrates examples of open-ended questions employed in the survey [9].

1. What learning experiences or aspects of the major program you studied for have been most beneficial to you in your career after graduation? --- --- ---
2 What learning experiences or aspects of the major program you studied for have been least beneficial to you in your career after graduation? --- --- ---
3. If you were going to improve the major program you studied for what would be your top 3 recommendations? --- --- ---
4. What professional experiences, did you learn in the real professional world which you did not learn or know about during your academic experience? --- --- ---

Fig. 3 Open-ended questions

7.2 Closed-Ended Response Questions

Closed-ended responses are designed to provide respondents with specific responses, which can be standardised and classified into fixed alternative responses. In this approach, the researcher brings a closed question and has fixed alternative responses to choose from. In the example of MATRE survey questionnaire, which was designed to examine academics perception of specific factors related to research environment at the Higher Education in Syria and Lebanon, most of the questions employed are closed-ended response strategy [9]. Figure 4 illustrates examples of closed-ended questions employed in the abovementioned survey questionnaire.

Demographic Profile	
Year of Birth:	Gender: □ Female □ Male
Please indicate your current role in your institution other than teaching: □ President □ Dean □ Dean's deputy □ Head of department □ Department board member	
Marital Status: Single □	Married □
Research and Publications	
How many hours (on average) do you dedicate weekly to Scientific research?	
Are these hours part of your faculty job? Yes □	No □
Scale your research motivations (Rank from 1 to 5, where 1 indicates the strongest one, 2 by the second choice and so forth):	
☐ Tenure Requirement ☐ Financial benefits ☐ Business Request ☐ Career improvement ☐ Others, specify:	

Fig. 4 Closed-ended question

8 Instrument Improvement

The question design or style is another issue the researcher bears in mind when developing and building the questionnaire. One of the most significant considerations for many researchers is whether to ask a question in an opened or closed format. In the case of opened questions, the respondent is asked a question with no limitation or given choices where they could choose from [7]. The respondent has the freedom to answer as they wish. In the case of closed questions the respondent is presented with a set of choices from which they can select an appropriate answer. With self-completion questionnaires, most of the questions are likely to be closed [7]. The process of developing a strongly constructed questionnaire is extremely important as it is one of the most important reasons for accomplishing a good response rate. An attractive layout is more likely to increase the response rate than other tactics such as reducing the margins or space between questions [10]. Due to the low response rate problem, it is preferable to design the questionnaire as short as possible, assuring that the layout is easy on the eye and that it facilitates answering all the questions that are relevant to the respondent [7]. Other methods includes building trust and empathy with the respondents by stressing on the question of confidentiality and anonymity. The assurance of confidentiality is predicted to increase respondents' motivation to complete questionnaires [11]. Alternative response strategies with the aim of improving the response rate are considered [6]. Pretesting is an advisable approach to do before the start of study and data collection. Pretesting is the assessment questionnaire item before the actual start of data collection [11].

9 Conclusion

This chapter examined self-administered survey questionnaire as an instrument of collecting primary data in business research study. The process of questionnaire design is examined at the aim of clarifying aspects including purpose of research study, questionnaire format, response strategy, communication approaches and structure.

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Case Study on the Causes of Plagiarism in Some Higher Education Institutions in Syria

Victoria Khnouf

1 Introduction

Plagiarism in higher education system became a worldwide phenomenon among universities, so that a majority of teachers are failing to adequately respond to this unethical practice, due to the huge impact of the digital means of communication [1]. Being a growing problem, plagiarism is generally defined as "literary theft" and "academic dishonesty" in the literature, and it is really crucial to be well-informed on this topic to prevent the problem and stick to the ethical norms [2]. Plagiarism is considered, among students in public and private universities in Syria within the higher education sector, a prevalent and growing phenomenon nowadays. In order to understand the causes of plagiarism, as a growing phenomenon, this case study has over scanned it, by using a random sample from some public and private universities in Syria. The exact causes of plagiarism are complex, but worth examining [3]. The aim of this case study is to identify the main reasons why students plagiarize in some higher education institutions in Syria.

2 Problem Background

This problem seems to be a complicated issue that we have focused in this case study on some important factors. These questions that need to be asked:

1. Are students practicing plagiarism because of stress, lack of time or lack of knowledge and training?
2. Is the internet helping these practices?

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3. Is the availability of commercial offices offering assignments and senior projects as a paid service for plagiarism problem?
4. Are their poor language skills considered as a reason to practice plagiarism?
5. Do teachers encourage plagiarism intentionally or not?

This case study focuses into the attitude of higher education's students at the Arab International University, and some public universities in Syria, in order to understand the main reasons of Plagiarism.

3 Methods

3.1 Sample

The sampling method in this study is a random sampling method. The questionnaire was distributed online to the students of the "Arab International University" and other private universities, as well as some others public universities in Syria, by using "Likert scale". In total, 43 students responded to the questionnaire.

3.2 Design

This is a quantitative case study having a survey research design. To gather data, a questionnaire was developed for this case study purpose, by adapting the "Attitude toward Plagiarism Scale" in the work of Lin and Wen's (2007) academic dishonesty in higher education—a nationwide study in Taiwan [4]. A numerical scale is employed in this study to measure students' perception of their teachers' response regarding their involvement in un-ethical plagiarized behavior. Table 1 illustrates employed semantic deferential scale.

Table 1 Numerical scale

Numerical Scale Level: Interval	Please evaluate the following statements and code your degree of agreement whether your teacher should or should not consider the following set of behaviours as plagiarism. Please identify using the following scale.						
	Teacher should consider this as plagia-rism	5	4	3	2	1	Teacher shouldn't consider this as plagia-rism

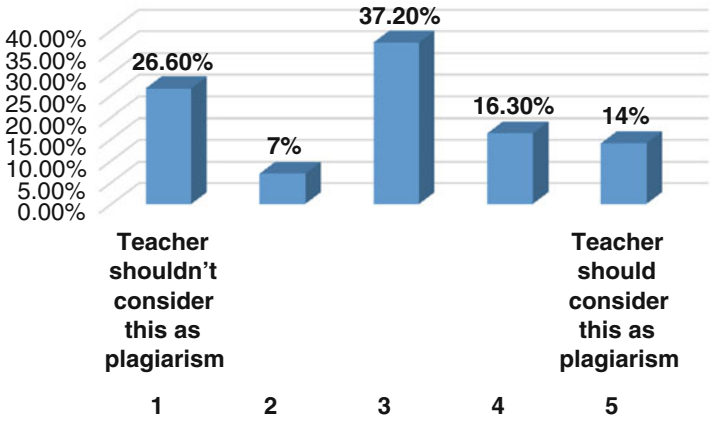

Fig. 1 Students plagiarize due to stress factors

4 Data Analysis

4.1 Students Plagiarize Due to Stress Factor

The first statement examined stress factors students could be experiencing during their academic study. The statement investigates whether students conceive that their teachers will consider study stress as an acceptable excuse for plagiarism. Descriptive Data indicates that 26.6% of students responded that teachers should not consider this behavior as an act of plagiarism, where as 14% responded that teachers should.

Figure 1 shows that the majority of students, which were around 37.2%, believe that their teachers would have a neutral opinion towards plagiarism behavior due to stress factors.

4.2 Students Plagiarize Due to Lack of Time

The second statement examined is the lack of time as an excuse of plagiarism. The statement investigates whether students conceive that their teachers will consider lack of time as an excuse of unethical and plagiarized behavior. Figure 2 shows that the majority of the students, which is in this case are 34.29%, have a neutral opinion according to plagiarism due to lack of time, while 25.6% believe that teachers should consider such behavior as plagiarism.

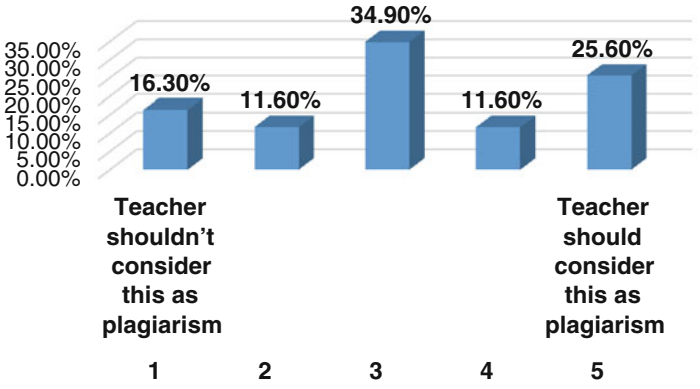

Fig. 2 Students plagiarize due to lack of time

4.3 Students Plagiarize Due to Lack of Knowledge and Training

Lack of knowledge and training is examined in the third statement as a possible excuse for plagiarism among students. The statement investigates whether students conceive that their teachers will consider this factor as an excuse for plagiarized behavior. Figure 3 shows that the majority of the students, 30.2%, were against plagiarism due to lack of knowledge and training, while 27.9% have a neutral opinion. 18.6% of respondents perceive that their teacher should not consider such unethical behavior as plagiarism.

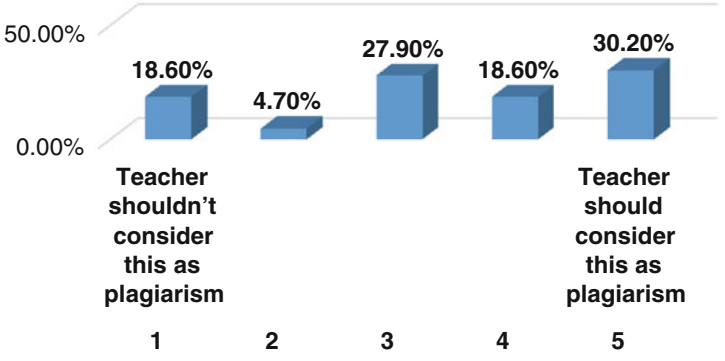

Fig. 3 Students plagiarize due to lack of knowledge

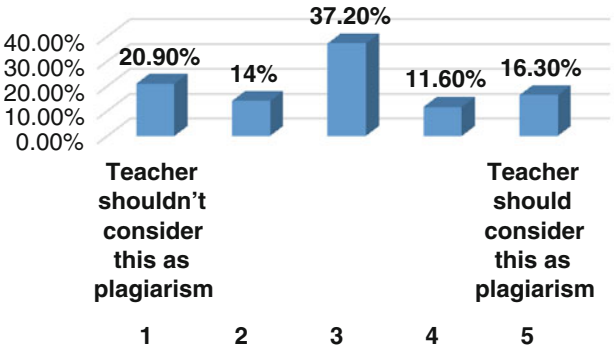

Fig. 4 Students plagiarize due to availability of copying from the Internet

4.4 Students Plagiarize Due to Availability of Copying from the Internet

The fourth statement studied students' accessibility to the internet and plagiarizing assignments. Figure 4 shows that the majority of students which is 37.2% have a neutral opinion, while 20.90% believe that their teachers should not hold them accountable for cheating through the internet. 16.30% believe that their teachers should consider copying from internet as cheating and unethical.

4.5 Students Plagiarize Due to the Availability of Commercial Offices, Offering Paid Assignments and Senior Projects

The fifth statement studied the availability of commercial offices and services which prepare assignments for students in return of money. Figure 5 shows that a high percentage of students, 53.5%, are against plagiarism in this approach, meaning that students would easily accomplish assignments without any academic effort. On the other hand 11.60% believe that their teachers should not consider such practice as cheating and plagiarizing.

5 Conclusion

Based on the results provided by the current case study it could be concluded that the ethical issue towards plagiarism in higher education institutions in Syria was approximately a responsible attitude towards students unethical behavior, particularly with regard to question 5 which studies students opinion towards students

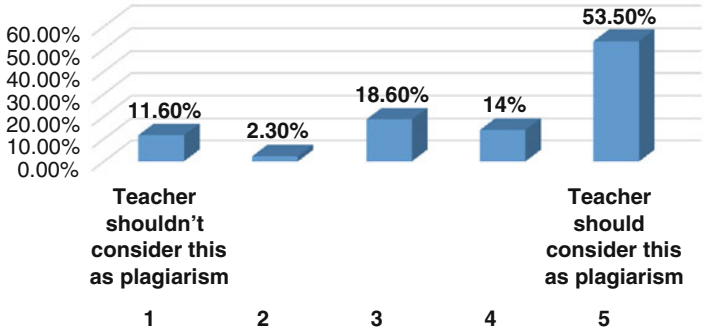

Fig. 5 Students plagiarize due to availability of commercial offices, offering paid assignments and senior projects

obtaining assignments form commercial service offices. It can be considered that the highest percentage of students are against plagiarism, especially when performing assignments or senior projects conducted by others for particular financial reward.

As a summary, the following could be concluded that 25% of the students were plagiarizing because of the psychological pressure, 25% of the students were against plagiarism due to a lack of time, majority of the students are against plagiarism due to lack of knowledge and training, 20% of the students have justified plagiarism through the internet and more than 50% of the students are against paying money for assignments. The case over scans the possible causes of plagiarism among students in universities in Syria by analyzing responses and attitudes towards this unethical practice. Decision makers in higher education institutions in Syria are advised to take corrective actions and measures to equip students with the necessary knowledge and skills to achieve scientific and ethical performance.

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The Case of MATRE Questionnaire for Academics: Measurement Scales, Lessons and Questions Reformulation

Serene Dalati

1 Introduction

The purpose of the MATRE study is to examine a number of factors related to business research environment in Syrian Higher Education Institutions (HEI). These factors include human resources, motivation to constructing research, technological factors, research infrastructure, research equipment, facilities, and software programs. Factors including access to databases, scientific journals and international conference are also factors included in this research study. Questionnaire design, measurement scales and response types are discussed in the case with the aim of evaluating main strength and weaknesses of the questionnaire.

2 Research Background

The prevalent organizational environment of Higher Education industry in Syria, namely public universities, could be characterized by a traditional managerial approaches with strong bureaucratic environment, application of outdated methodologies, lack of individual recognition, lack of effective encouragement of outstanding performance, limited collaboration with international conferences and academic journals, and most important, a turbulent political environment which goes back to the last five years represented by a political and national crisis in Syria [1]. The research environment in Syrian Higher Education could be characterized by a potential, among Syrian researchers for conducting research with a number of weaknesses and threats which can be characterized due to the lack of solid research infrastructure (library resources, electronic databases, and access to scientific journal), lack

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of awareness of up-to-date research methodologies, lack of individual motivation to conduct research, and a turbulent political and economic environment in Syria [2]. Against this background the MATRE project, which is funded by TEMPUS program, was developed and successfully launched in 2014 with the aim of modernizing research and teaching environment in Syria and Lebanon.

3 MATRE Survey Questionnaire Methodology

MATRE research methodology employed the application of a self-administered questionnaire as the main instrument of data collection. This, by definition, adopts a quantitative approach of methodology design where the questionnaire designer develops questions to help them answer research questions and collect data under examination. MATRE research study sample size is comprised of 38 cases selected from the Damascus University (DU), the Arab International University (AIU) and the International University for Science and Technology (IUST). The sampling strategy employed in MATRE research for academics follows a non-probability sampling technique.

3.1 The First Phase: Research Questionnaire Formulation and Design

The first phase was initiated in April 2014 with the aim of examining the MATRE project implementation plan including work packages, project wider and specific objectives, indictors of progress and measurement of the indicators, and the assumptions and risks related to implementation of project. The first work package of MATRE project examines conducting surveys and analysis on research environment in Higher Education in Syria and Lebanon reporting on research in Business by collecting data on active researcher and existing research publication, as well as factors related to research including research infrastructure, methodologies, required tools, individual motivation for research, collaboration with business and international partners and regulations and policies, related to research environment in Syria and Lebanon.

Brainstorming sessions between project partners took place with the aim of staring the Work Package 1 (WP1) implementation by examining the objectives of research survey and design of survey questionnaire. Project researchers stressed the clarification of objectives of questionnaire and factors measures. Defining the parameters of study was a major objective prior to survey questionnaire design. Theoretical development of the questionnaire was based on defining factors related to research in Higher Education. Prior research examines factors related to Higher Education and research environment including academics expertise, the courses offered, learn-

ing environment, and infrastructure [3]. In addition previous literature on research environment in Higher Education is also examined [4].

A team of researchers representing partner universities and business partners in the MATRE project designed the survey questionnaire. The questionnaire design process was initiated in May 2014 with first draft developed by researchers from the Vilnius Gediminas Technical University (VGTU). The second draft was developed by researcher from AIU and was substantially built on the first draft. Improvement on the questionnaire layout, structure and questions wording were conducted. The final draft was formulated by researchers from IUST and DA.

This research applies nominal, ordinal, interval and ratio data. Rating scale is applied in this research, through the use of simple category scale, multiple choice single response, multiple choice multiple response and Likert scale. The ranking scale is also employed in MATRE questionnaire academics study.

3.2 The Second Phase: Research Questionnaire Translation

MATRE questionnaires were originally developed in English. The second phase comprised the translation of the questionnaires from English to Arabic. Back translation was not conducted due to lack of time. Back translation is constructed as the scale is originally developed in English. It is advisable to conduct back translation in cross cultural research, where the scale is designed and distributed in more than one language [5].

Further improvement on the translation was conducted to examine minor details related to scaling and translations. Discussion with experts from project partners were conducted. Questionnaire translation was completed during June 2014.

3.3 The Third Phase: Combined Approaches of Data Collection

Questionnaires were distributed to academics in Syria and Lebanon. The unit of analysis is Higher Education academic staff. Two techniques were applied in data collection phase including the design of online survey and the application of paper and pencil survey questionnaire approach. Questionnaires were distributed to respondents. Minor mistakes were conducted during this stage, as in the online survey questionnaire followed a scale approach in question 14 which was different from the original design of the questionnaire. This resulted a discrepancy in responses between the online survey questionnaire responses and paper and pencil survey questionnaire approach. This point will be examined in research evaluation thoroughly. Data was collected in July 2014.

3.4 The Fourth Phase: Data Analysis

Descriptive data analysis was conducted including the calculation of means, frequencies and standard deviation of the questions. Descriptive data analysis included respondents' demographic profile and questionnaire target research questions. Research data analysis was conducted during August 2014. Descriptive data analysis levels, sufficient the level of significant information to make decisions related to developing MATRE training fields and areas.

3.5 The Fifth Phase: Report Write up

The final report write up was completed in October 2014. The report was reviewed from the MATRE project partners.

4 MATRE Questionnaire Structure

The MATRE questionnaire for academics was mainly structured into two sections, demographic section and target research section.

4.1 Questionnaire Demographic Section

MATRE questionnaire demographic section was comprised of a set of questions which includes personal and work related questions including date of birth, gender,

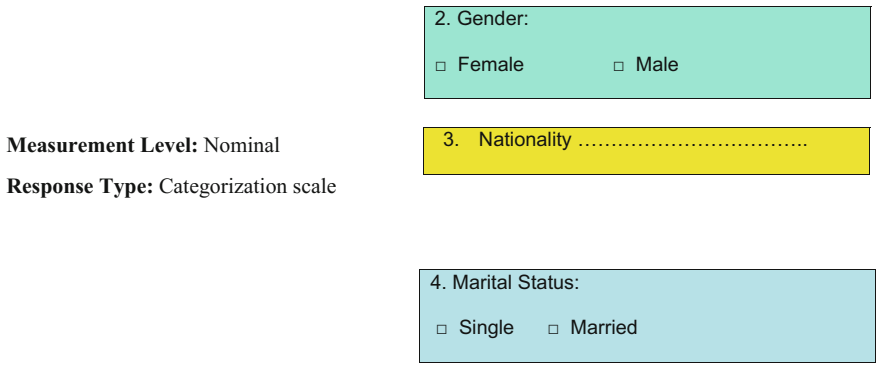

Fig. 1 Demographic profile section

nationality, marital status, institution, academic and organizational roles, and education levels. Response type scales employed in this section includes categorization and ratio scales. Measurement levels employed in the questionnaire demographic profile include nominal, interval and ratio levels. Response types and measurement scales employed in this section include categorization scale. Figure 1 illustrates demographic profile questions illustrating levels of measurement and response types.

4.2 Questionnaire Target Research Section

The MATRE questionnaire target research section question examined factors related to Business Research environment in Higher Education in Syria and Lebanon. These factors include academic business research and publication, cooperation with business sectors, human resources, and motivation to constructing research, technological factors, research infrastructure, research equipment, facilities and software programs, databases, scientific journals and international conferences. Measurement levels employed in the questionnaire target research questions include nominal, ordinal, interval and ratio levels. Response types and measurement scales employed in this section include simple category scales, multiple choice single response scale, multiple choice multiple response scale, Likert scale, forced ranking scale and categorization scale.

4.2.1 Simple Category Scale

Simple category scale is employed in questionnaire target research questions. Examples of simple category scale are illustrated in questions 13, 18, 22, and 25. Figure 2 illustrates questions where the simple category scale is employed.

4.2.2 Multiple Choice Scale, Single Response

Multiple Choice scales are employed in the MATRE questionnaire for academics both as single and multiple responses. Example of multiple choice, single response is illustrated in question 31. Multiple choice, multiple responses scales are employed in questions 16, 17, 23, and 24. Figure 3 illustrates multiple choice scale, single response questions.

Measurement Level: Nominal

Response Type: Simple Category Scale

18. Do you think that current regulations hinder (inhibit) the development of the research environment
□Yes □ No

Fig. 2 Simple category scale

Measurement Level: Nominal

Response Type: Multiple Choice, Single Response

31. Do study programs in your institution have integrated subjects related to scientific research activities (e.g. How to prepare a questionnaire, how to indicate sample size, how to analyse data, etc.)?

1. Yes, the study course
2. Yes, some hours in other study courses
3. No
4. I cannot answer

Fig. 3 Multiple choice scale, single response

Measurement Level: Nominal

Response Type: Multiple Choice, Multiple Response

16. In general, what are the evaluation criteria of the academic staff at your faculty? Please check all options that apply.

□ Teaching quality.
□ Research activity; publications.
□ Research activity; projects with enterprises.
□ Writing textbooks.
□ Supervising Master and PhD students.
□ Other, please specify

Fig. 4 Multiple choice, multiple response

4.2.3 Multiple Choice, Multiple Response

Multiple Choice, multiple response scale is employed in the MATRE questionnaire. Examples of multiple choice, multiple response is employed in questions 16, 17, 23, and 24. Figure 4 illustrates multiple choice, multiple response questions.

4.2.4 Likert Scale

Likert Scales is employed in the MATRE questionnaire for academics. Examples of Likert scale questions are 27, 28, 29, 30, and 33. The Likert scale has the characteristics of classification, order and distance. It is selected to measure respondents' attitude about statements constructed (Fig. 5).

4.2.5 Ranking Scale

Ranking scale is employed in the MATRE questionnaire for academics. Example of forced ranking scale question is employed in question 15. Figure 6 illustrates of forced ranking scale.

Measurement Level: Interval
Response Type: Likert Scale

27. What are the main inhibitors and barriers to develop cooperation between your institution and business? Please identify using the following scale.
Scale: 1-Absolutely not influential 2-Not influential 3-Neither nor 4-Influential 5-Absolutely influential

	1	2	3	4	5
Business reputation	○	○	○	○	○
Academic reputation	○	○	○	○	○
Political aspects	○	○	○	○	○
Insufficient human resources for collaboration (e.g. researchers, professors and etc.)	○	○	○	○	○
Insufficient individual motivation	○	○	○	○	○
Other_____	○	○	○	○	○

29. How do you assess the working conditions of researchers in your institution / faculty?

Scale: 1-Very poor 2-poor 3-Neither nor 4- good 5- very good

	1	2	3	4	5
Select only one answer in the scale	○	○	○	◉	○

Fig. 5 Likert scale

Measurement Level: Ordinal

Response Type: Forced Ranking Scale

15. Scale your research motivations (Rank from 1 to 5, where 1 indicates the strongest one, 2 by the second choice and so forth):
□ **Tenure requirements**
□ **Financial benefits**
□ **Business Request**
□ **Career improvement**
□ **Others, specify:**

Fig. 6 Ranking scale

Measurement Level: Nominal

Response Type :
Categorization Scale

10. Please indicate your current role in your institution other than teaching:
□ President
□ Dean
□ Dean's deputy
□ Head of department
□ Department board member

Fig. 7 Categorization scale

4.2.6 Categorization Scale

Categorization scale is employed in the MATRE questionnaire for academics. Examples of categorization scale are employed in questions 14, and 21 (Fig. 7).

5 Questionnaire SWOT Analysis

A SWOT analysis is conducted with the aim of evaluating major strength, weaknesses, opportunities and threats in the design and production of the MATRE questionnaire for academics.

5.1 Strength

It could be argued that the most significant strength that characterizes the MATRE questionnaire for academic is the variety in measurement scales and response types applied. Rating, ranking and categorization are applied representing variation of responses and providing participants with different approaches of response. A self-completed questionnaire has many advantages which are discussed in the previous literature and textbooks on Business research methods [6, 7]. MATRE questionnaire advantages include lower cost of data collection and efficiency in time. It also argued that a combined approach between paper and pencil technique and online survey techniques are considered a strength point. The drawback of the combined approach is due to lack of coordination between survey questionnaire administrators, which resulted in inconsistent response types and data in terms of the relation to question 14.

5.2 Weaknesses

The areas of weaknesses or development could be characterized by scaling response types and implementation of questionnaire data analysis. The first minor area of weakness or development is being related to question 14. This above-mentioned question follows a categorization scale where the measurement level is at a nominal level. Originally the scaling of the question 14 was designed to enable participants to respond questions about tools related to conducting research including PCs, laptops, internet, software, access to database and other related resources. This response type enables participants to pick choices whether these tools under investigation are needed, available or unavailable. Figure 8 illustrate the design of question 14.

The argument which could be developed in this example is that the design of the response type took careful consideration of asking respondents about the need, availability, or unavailability of research tools under investigation. However, the design of the question did not take into consideration adding a fourth category to represent if the tool is not needed.

A better approach was designed and implemented in the online survey questionnaire, which was designed by DA where the following rating scale was designed. The drawback for this implementation is due to lack of coordination between partners, which resulted in discrepancy in the scales and response types and consequently the

14. Which tools, from the given list, do you need for conducting research? (tick (□) for Yes)

Tool	Needed	Available	Unavailable
PC/ Laptop			
Private Internet			
Libraries			
Faculty's Internet Laboratory			
Software (SPSS, STATA, Nvivo, etc)			
Access to scientific databases (i.e. data-stream)			
Databases for scientific journals (EBESCO, J-Store, etc.)			

Fig. 8 Tools need and availability categorization scale

14. Which tools, from the given list, do you need for conducting research?
Scale 1. Needed and available 2. Needed and not available 3. Not needed

Tool	**1**	**2**	**3**
PC/ Laptop	□	□	□
Private Internet	□	□	□
Libraries	□	□	□
Faculty's Internet Laboratory	□	□	□
Software (SPSS, STATA, Nvivo, etc)	□	□	□
Access to scientific databases (i.e. data-stream)	□	□	□
Databases for scientific journals (EBESCO, J-Store, etc.)	□	□	□

Fig. 9 Tools need and availability improved categorization scale

data, which resulted from different response types. Figure 9 illustrates an improved categorization scale for question 14.

Other limitations include minor weaknesses related to question 30 in terms of questions wording and grammatical phrasing (e.g. a quality of master's and doctoral studies strongly depends on the lack of scientific research infrastructure). Clearly improvement in terms of scaling, questionnaire items content and wording would reinforce and support the instrument.

5.3 Opportunities

The major opportunity related to MATRE questionnaire would be by collecting further data through the questionnaire and conducting research on factors related to Higher Education in Syria and Lebanon. Such studies may include different approaches in research on quality assurance in Syria and Lebanon. Other research opportunities also include collaborating with MATRE international partners conduct-

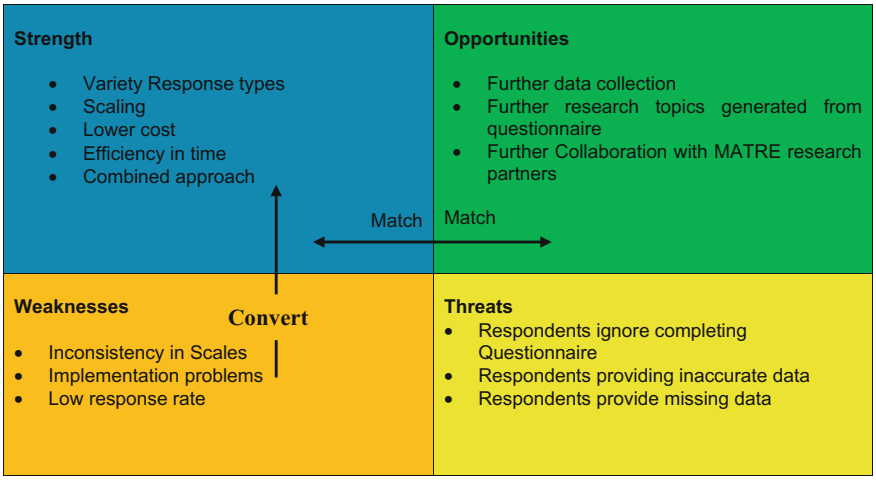

Fig. 10 SWOT Matrix

ing joint research studies on different HEI within the scope of the MATRE project partners.

5.4 Threats

The major threat, which is generally related to the employment of self-administered questionnaires, is related to participants not responding to questionnaire resulting in low response rate [8]. In some occasions participants may provide wrong or missing data due to lack of questions understanding. MATRE questionnaire for academics is no exception to this rule. With a response rate estimated to be less than 30% a risk or threat for the success of research becomes evident. The solution to this problem is follow up by data collection to secure acceptable levels of response rate (Fig. 10).

6 Discussion

SWOT analysis of the MATRE shows different factors which could be taken into consideration. Firstly, questionnaire design clearly shows variety of measurement scales which will be significantly reflected in the level of data analysis. This is a strength point in the questionnaire, which will be positively reflected in the level of data analysis and the variety of research topics, which are under examination in the questionnaire in future research.

SWOT analysis also shows discrepancy and inconsistency of response types between traditional approach of paper and pencil and online survey related to question 14. Coordination between survey questionnaire administrators is a crucial element to effective completion of survey questionnaire. A mixed approach combining paper and pencil and online approaches requires levels or integration and coordination between survey questionnaire administrators.

7 Conclusion

This chapter examined the case of MATRE questionnaire for academics scrutinizing the overall process of instrument design, translation of the questionnaire and combined approach of both paper and pencil, and online survey questionnaire design approach. An evaluation of advantages and drawbacks of the instrument is provided. The potential of conducting further research and the employment of the questionnaire is significant. Areas of development can be further discussed.

Appendix—MATRE Research Environment Questionnaire-Academics

This questionnaire is part of MATRE project funded by EU aimed at modernizing academic teaching and research environment in business and economics at Lebanon and Syria. The purpose of this questionnaire is to identify factors impacting research environment in Higher Education in Syria and Lebanon. We would be grateful if you could take 15 min of your time to answer the following questions electronically or return it in the pre-paid envelop provided.

All gathered data will be for the purposes of research only.

A. Personal and Work Information:

1. Year of Birth:
2. Gender: □ Female □ Male
3. Nationality:
4. Marital Status: □ Single □ Married
5. Your Primary University:
6. Faculty/ Institution:
7. Department:
8. Years of experience in teaching:
9. Current Academic post: □ Lecturer □ Assistant Professor □ Professor
   □ Other, specify: _____
10. Please indicate your current role in your institution other than teaching:
    □ President □ Dean □ Dean's deputy □ Head of department □ Department board member
    □ Other, specify: _____

B. Education Information:

11. From which university did you get your degree(s), where, and when?

Degree	Name of the University/ Institution	Country	Year
BA			
Master			
PhD			
Other, specify:			

C. Research and Publications:

12. How many hours (on average) do you dedicate weekly to Scientific research?

13. Are these hours part of your faculty job?
    ☐ Yes
    ☐ No

14. Which tools, from the given list, do you need for conducting research? (tick (✓) for Yes)

Tool	Needed	Available	Unavailable
Personal Computer / Laptop			
Private Internet			
Libraries			
Faculty's Internet Laboratory			
Software (SPSS, STATA, Nvivo, etc)			
Access to scientific databases (i.e. data-stream)			
Databases for scientific journals (EBESCO, J-Store, etc.)			

15. Scale your research motivations (Rank from 1 to 5, where 1 indicates the strongest one, 2 by the second choice and so forth):

    ☐ Tenure requirements
    ☐ Financial benefits
    ☐ Business Request
    ☐ Career improvement
    ☐ Others, specify:

16. In general, what are the evaluation criteria of the academic staff at your faculty? Please check all options that apply.
    ☐ Teaching quality.
    ☐ Research activity; publications.
    ☐ Research activity; projects with enterprises.
    ☐ Writing textbooks.
    ☐ Supervising Master and PhD students.
    ☐ Other, please specify:

17. In general, what are the promotion criteria of the academic staff at your faculty? Please check all options that apply.
    ☐ Teaching quality.
    ☐ Research activity; publications.
    ☐ Research activity; projects with enterprises.
    ☐ Writing textbooks.

☐ Supervising Master and PhD students.
☐ Other, please specify:

18. Do you think that current regulations hinder (inhibit) the development of the research environment?
☐ Yes
☐ No

19. If yes, which regulations/ articles need to be changed (or modified)?

20. Please list **5 main** research areas you focus on:
i. _____
ii. _____
iii. _____
iv. _____
v. _____

21. How many scientific research outputs have you published through your scientific career?

	Local	Arab	Foreign
Report in scientific conference			
Article in scientific conference proceedings			
Article in peer reviewed scientific Journal			
Registered patent			
Monograph			
Other …….			

D. Cooperation with Business Sector

22. Do you have experience in collaboration with business?
☐ Yes
☐ No

23. If your answer is YES, to question 22: How do you usually contact these partners? (please check all that apply)
☐ Existing personal contacts of staff;
☐ Conferences/fairs;
☐ Visits/travel;
☐ Through the University unit in charge;
☐ E-mail/mail/telephone;
☐ Others; please specify: _____

24. How do social and business partners usually participate in the scientific research activities of your institution?
Please select until 3 answers
☐ They offer applied research topics
☐ They offer scientific internships
☐ They initiate applied scientific research projects
☐ They advise researchers working on scientific research
☐ They participate in common institution/ faculty scientific projects
☐ They participate in joint scientific seminars, workshops, scientific conferences
☐ They contribute to the research design, development and evaluation
☐ They review the results of scientific research
☐ They provide data to researchers when needed
☐ Other _____

25. Are you aware of any agreements between your faculty and the business?

☐ Yes
☐ No

26. If yes, what are the objectives of these agreements?

27. What are the main inhibitors and barriers to develop cooperation between your institution and business? Please identify using the following scale.
Scale: 1- Absolutely not influential 2- Not influential 3-Neither nor 4- Influential 5- Absolutely influential

	1	2	3	4	5
Business reputation	○	○	○	○	○
Academic reputation	○	○	○	○	○
Political aspects	○	○	○	○	○
N Insufficient human resources for collaboration (e.g. researchers, professors and etc.)	○	○	○	○	○
N Insufficient individual motivation	○	○	○	○	○
Other_____	○	○	○	○	○

FE. Other Information

28. Please evaluate the impact of each of the following factors on the development of your scientific research activity. Please identify using the following scale.
Scale: 1- Absolutely not influential 2- Not influential 3-Neither nor 4- Influential 5- Absolutely influential

	1	2	3	4	5
C Data collection requirements	○	○	○	○	○
1-Availability of knowledge about the existence of open access databases	○	○	○	○	○
2-Availability of information about international conferences	○	○	○	○	○
3-Availability of university/faculty scientific journals abroad	○	○	○	○	○
4-Availability of information about scientific projects	○	○	○	○	○
5- Availability of statistical databases	○	○	○	○	○
6- collaboration with international researchers	○	○	○	○	○
7-Provision of knowledge and skills on how to make scientific research	○	○	○	○	○
N Research infrastructure:					
1) Internet connection	○	○	○	○	○
2) Library	○	○	○	○	○
3) Access to scientific databases	○	○	○	○	○
4) Research equipment	○	○	○	○	○
5) Software (e.g. SPSS)	○	○	○	○	○
6) Laboratories	○	○	○	○	○
7) Other_____	○	○	○	○	○
Financial support by the faculty for research	○	○	○	○	○
Availability of sufficient researchers to collaborate in research	○	○	○	○	○
Individual motivation	○	○	○	○	○
Other_____	○	○	○	○	○

29. How do you assess the working conditions of researchers in your institution / faculty?
Scale :1-Very poor 2-poor 3-Neither nor 4- good 5- very good

	1	2	3	4	5
Select only one answer in the scale	○	○	○	○	○

30. How the following aspects characterized your institution / faculty?
Please, assess every aspect. Please identify using the following scale.

1-Strongly Disagree 2-Disagree Agree 3- Not sure 4-Agree 5-Strongly agree

	1	2	3	4	5
Classrooms, laboratories, and other facilities and equipment are adapted for scientific activities	○	◉	○	○	○
The library has enough methodological and scientific books, international journals and other needed materials	○	○	○	○	○
During practical exercises and laboratory work, students have enough equipment for making scientific research	○	○	○	○	○
The quality of Master's and doctoral studies strongly depends on the lack of scientific research infrastructure	○	○	○	○	○
Sufficient Qualitative and Quantitative research methods and tools for doing scientific activities	○	○	○	○	○
Sufficient administrative and technical staff that ensure the quality of scientific research activity process	○	○	○	○	○

31. Do study programs in your institution have integrated subjects related to scientific research activities (e.g. How to prepare a questionnaire, how to indicate sample size, how to analyse data, etc.)?

1. Yes, the study course
2. Yes, some hours in other study courses
3. No
4. I cannot answer

32. What are the main skills in running scientific research at your institution:

	Importance of Skills Aimed (Sought)			Satisfaction with Skills Found		
	Not important	Important	Very important	Not satisfied	Satisfied	Very satisfied
1. Interpersonal skills						
2. Multi-lingual						
3. Internship experience						
4. Analytical skills						
5. Leadership						
6. Depth of knowledge in subject						
7. International experience						
8. Technical skills						
Other						

33. Please evaluate, how these factors could help in developing your skills to run scientific research at institution/faculty

1-Absolutely not helpful 2-Not helpful 3- neither nor 4-Helpful 5- Absolutely helpful

	1	2	3	4	5
1-Internationalization of research environment at university	○	○	○	○	○
2-Academic entrepreneurship	○	○	○	○	○
3-Prepared handbooks on how to make scientific research	○	○	○	○	○
4-Established university/faculty business centre	○	○	○	○	○

5-Effective motivation system at university/faculty					
6-Special training on how to use scientific methods and tools					
7-Special training on how to write scientific article					
8-Existence of international journal at your university/faculty					
9-Organizing international conferences at university/faculty for sharing scientific results					
10-Organizing special scientific workshops at university/faculty					
11-Participation on long-term research projects					
12-Strong linkages with industry and university/faculty					
13-English language skills					
14-Collaboration in multidisciplinary teams					
15-Developing an entrepreneurial culture that enables to turn ideas into real businesses					
16-Open access databases					
17-Other					

If you would like to know about the results of the survey, please enclose your business card/details and/or email. Thank you very much again for your co-operation in completing the survey.

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